

**Thermo Scientific System 21 Process Optimization Training
Course Outline**

Course Objectives

This course is designed to provide the customer with a detailed understanding of the Thermo Scientific System 21 gauging system. Upon completion of this course, the student will be confident in their ability and also maximize the functionality of the system.

Course Content

- ◆ System Components and Architecture
- ◆ Measurements
- ◆ Product & Process Variation Analyses
- ◆ Machine Direction & Profile Controls
- ◆ System Calibrations
- ◆ Data and Log file Use
- ◆ Software Maintenance

Course Schedule

Classes will be held Tuesday through Thursday from 8:30 through 4:30.

Prerequisites

All attendees of this course should have good knowledge of their process and have some familiarity with processing equipment, computer systems, and process controls. Each student will be required to sign a secrecy agreement protecting product design details for both parties.

Evaluation

Each attendee of this course will participate in a 60-minute examination. Results of these examinations will be available for customer review. Upon successful completion of the course, a certificate of completion will be issued to all who successfully complete the course work.

Materials

Each attendee will receive all necessary materials in software format to complete the course. Hard copies of materials will no longer be provided unless specifically requested and paid for in advance. All attendees will be required to have a laptop computer to facilitate the training.

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TOPIC BREAKDOWN:

Introduction

The course begins with a brief discussion of course objectives and schedules, along with a tour of the manufacturing facilities. After the facility tour, the instructor will review customer specific configurations and their impact on the training.

System Components and Architecture

The student will learn in detail about various measurement platforms, scanning platforms, computing platforms, and process interfaces. The student will be able to comprehend what constitutes a complete network based control system and how our products interconnect to provide a measurement and control system.

Measurements

An explanation of the functionality of the Thermo Scientific sensors - Beta Sensor and/or Full Spectrum Infrared (FSIR) Sensor is provided. This part is based on specific system configuration. The student will perform diagnostics and troubleshooting. A more detailed course is available for the FSIR customer; please contact Customer Service for further details. Calibration curve fitting and error determination are discussed. Where applicable, a section covering Thermo Scientific SICAL and Same-Spot Measurement will be added to this discussion.

Product & Process Variation Analyses

The product and process variations present in continuous web processes are discussed. Sources of variation are identified, the System 21 features that ferret out these variations are presented, and plausible solutions are discussed. Each of the System 21 statistical calculations is presented for clarity.

Machine Direction & Profile Controls

A thorough review of both the Thermo Scientific Automatic Profile and Nominal Control is covered. We will discuss controls used in various customer processes. Common problems and expected performance levels are discussed. Particular attention is paid to tuning variables and long-term performance improvement.

System Calibrations

Product calibration discussion opens by reviewing Beer's Law, measurement statistics, and error determination. This is followed by the customer describing their off-line lab techniques. Alternative calibration techniques are also presented where high lab or sampling errors are present.

Software Maintenance

Software maintenance is a crucial component of System 21. During this topic, we will discuss maintenance scheduling for calibration, software archiving, and preventative maintenance programs.

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Course Registration

Classes are held in our facility located in Wilmington Massachusetts, USA. Class sizes are limited, therefore reservations are on first come, first serve basis and must be made no less than two weeks before the scheduled class. For reservations contact our Customer Service Department at 1-800-366-2533 or FAX your request to (978) 667-4146, Attention: Training Administrator.

Course Cost

Cost is \$3,500.00 for first student, all other students billing on the same invoice and attending the same class at a \$500.00 discount. **Course cost does not include travel and living expenses.**

Cancellations

There will be a cancellation fee of 20 % applied to all students canceling within three weeks of a class and a 50% fee for all students neither attending nor cancelling. Failure to attend for customers using contracted training slots will result in forfeiture of the contracted training slot.

Rescheduling

Thermo Fisher Scientific reserves the right to reschedule a class if there are less than three participants.