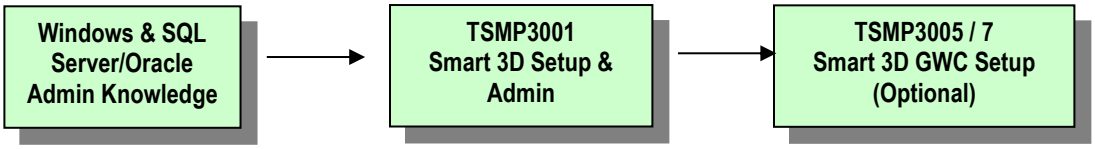
Intergraph Smart® 3D Plant/Outfitting Curriculum Path & Training Guidelines

Hexagon PPM recommends that new Intergraph Smart® 3D plant/outfitting users select one of the following training tracks described below.

1. System Support Track

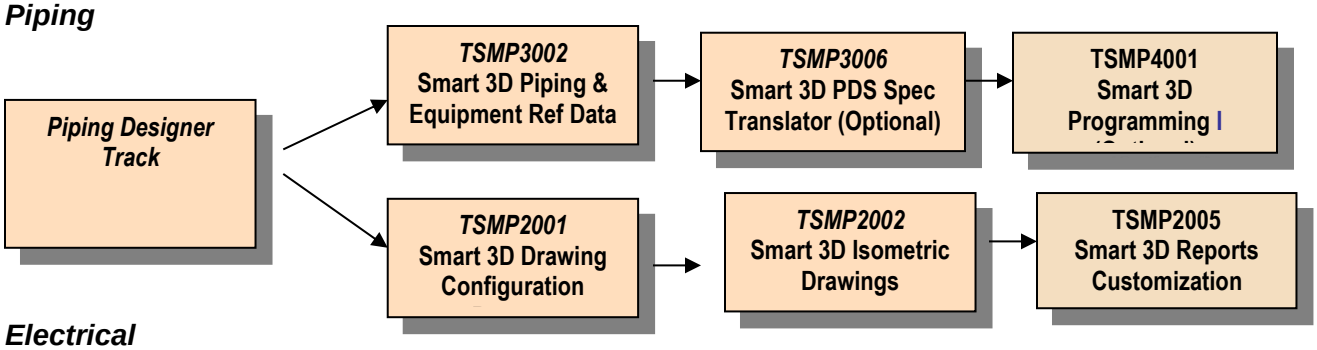
For people interested in setting up Smart 3D & databases and managing databases and applications more from systems perspective in terms of work sharing, permissions, backups etc.



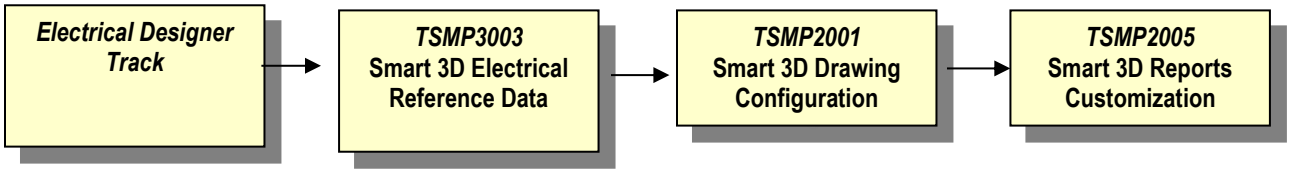
2. Discipline Specialist Track

For people interested in creating and maintaining reference data such as piping specifications, equipments for a particular discipline(s), configuration and generation of deliverables, providing first line support to end users (Designers).

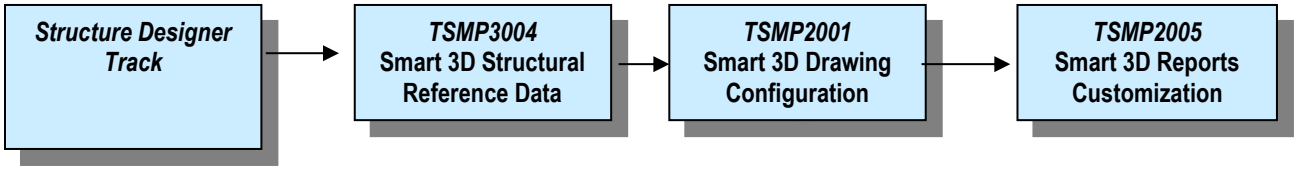
Piping



Electrical

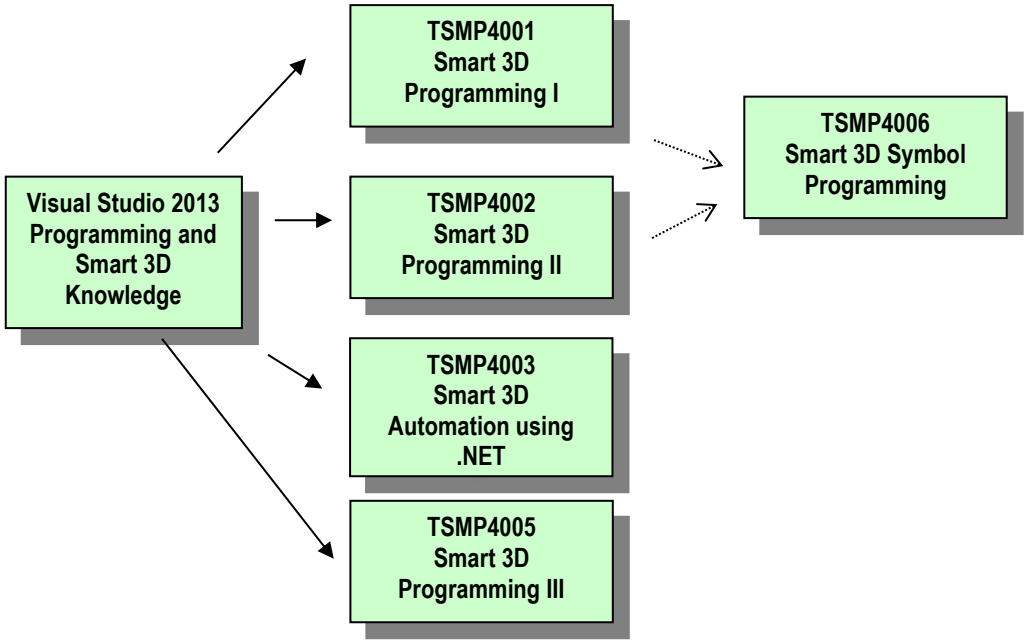


Structure



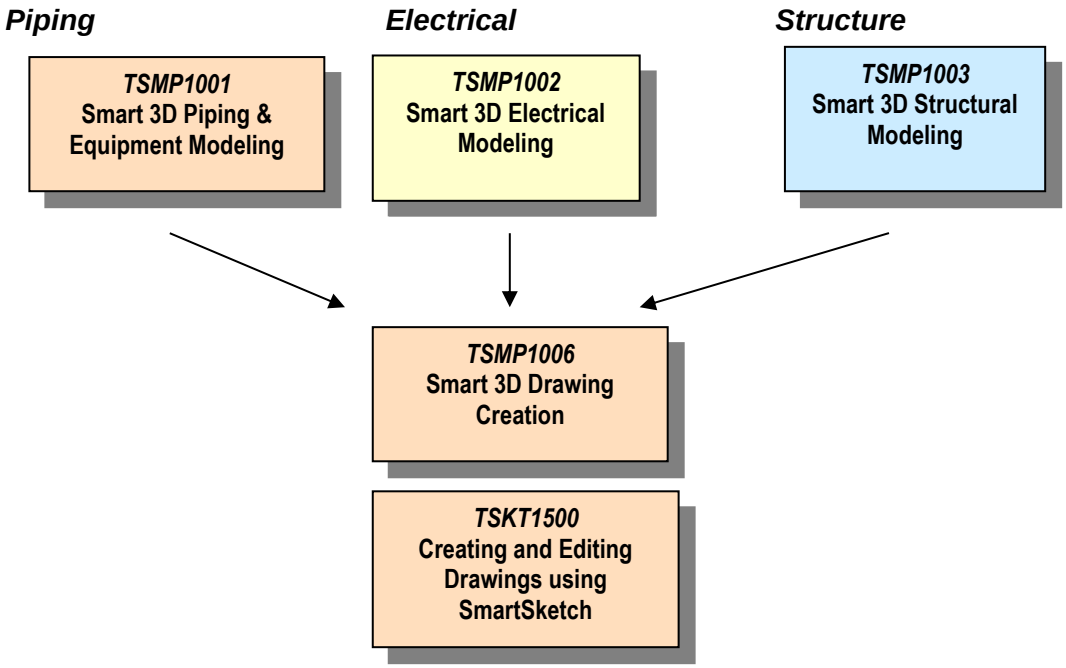
3. Automation Track

For people interested in programming and automating Smart> 3D across various disciplines. TSMP4006 is a combination of topics from TSMP4001 and TSMP4002 and may be taken by those interested in symbol programming only.



4. Designer Track

For people interested in creating 3D models for Piping, Electrical, or Structural disciplines.



Intergraph Smart® 3D | 2019
Includes SmartPlant® 3D, SmartMarine® 3D, SmartPlant® 3D Material Handling Edition

V2019 Training Course Highlights

Course Number	Title	No of Days	Per Enrollment (US $)	On-Site Excl. Travel (US $)
TSMP1001	Smart 3D Piping & Equipment Modeling	4.5	2750	13750
TSMP1002	Smart 3D Electrical Modeling	4.5	2750	13750
TSMP1003	Smart 3D Structure Modeling	4.5	2750	13750
TSMP1100	Smart 3D Designer Series	10	On-Site Only	27500
TSKT1550	Creating and Editing Drawings using SmartSketch	3	1650	8250
TSMP1006	Smart 3D Drawing Creation	2	1100	5500
TSMP2001	Smart 3D Drawings Configuration	4.5	2750	13750
TSMP2002	Smart 3D Isometric Drawings	4	2200	11000
TSMP2005	Smart 3D Report Customization	4	2200	11000
TSMP2050	Configuration of Integrated Environment with Smart 3D and Schematic Tools	4.5	2750	13750
TSMP3001	Smart 3D Setup & Administration	4.5	2750	13750
TSMP3002	Smart 3D Equipment & Piping Reference Data	4.5	2750	13750
TSMP3003	Smart 3D Electrical Reference Data	2	1100	5500
TSMP3004	Smart 3D Structural Reference Data	2	1100	5500

TSMP3005	Smart 3D Global Workshare Setup – SQL server	4.5	On-Site Only	13750
TSMP3007	Smart 3D Global Workshare Setup – Oracle	4.5	On-Site Only	13750
TSMP3006	Smart 3D PDS Piping Spec Translation	3	On-Site Only	8250
TSMP3008	Hangers and Supports Maintenance & Customization	5	On-Site Only	13750
TSMP4001	Smart 3D Programming I (Part Symbols & Rules)	4.5	2750	13750
TSMP4002	Smart 3D Programming II (Equipment Symbols and Forms)	3	1650	8250
TSMP4003	Smart 3D Automation using .NET	4.5	2750	13750
TSMP4004	Hangers and Supports Part & Assembly Creation	4.5	On-Site Only	13750
TSMP4005	Smart 3D Programming III (Stair, Ladder and Handrail Symbols)	2	1100	5500
TSMP4006	Smart 3D Piping, Electrical and Equipment Symbol Programming	4.5	2750	13750

Course Descriptions

Smart 3D Piping & Equipment Modeling TSMP1001

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for Piping Designers who will create piping models and other users who will create related reference data. The course features an introduction to the graphics environment, equipment modeling, followed by routing techniques for piping modeling and generation of isometric drawings.

Major Topics:

- Overview of Common Graphics Environment
- Defining a Working Set
- SmartStep Commands and User Options
- Interactive Interference Checking
- Equipment Modeling
- 3D Routing System
- General Routing Techniques
- Hangers & Supports
- Change Management
- P&ID Integration
- Isometric Drawing Generation

Prerequisites:

- Knowledge of Industrial Piping Design
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Electrical Modeling
TSMP1002

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for Cableway/Cable tray users involved in modeling and creation of reference data. The course features an introduction to the graphics environment, equipment modeling, and routing techniques for cableway, conduit and cable tray. Later part of the course is focused on creation and modification of reference data such as tray specifications.

Major Topics:

- Overview of Common Graphics Environment
- Overview of Common Graphics Environment
- Defining a Working Set
- SmartStep Commands
- Interactive Interference Checking
- Equipment Modeling
- Cableway and Cabletray Modeling
- Duct bank Modeling
- Conduit Routing
- Hangers & Supports
- Routing Cables

Prerequisites:

- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Plant Structural and Civil Modeling TSMP1003

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for Structural Designers who will create structural models, and other users who will create related reference data. The course features an introduction to the graphics environment followed by equipment & structural modeling techniques. Later part of the course is focused on creation of reference data such as user defined sections etc.

Major Topics:

- Overview of Common Graphics Environment
- Defining a Working Set
- SmartStep Commands and User Options
- Interactive Interference Checking
- Grid System
- Modeling Members
- Managing Connections
- SDS/2 Connect (optional)
- Fireproofing Members
- Modeling Slabs, Walls and Openings
- Modeling Stairs, Ladders and Handrails
- Modeling Footings and Equipment Foundations
- Solid Modeling
- Placing and Modifying Trenches and Ditches
- Exporting Structure Model in CIS/2 format
- Importing Detailed Structural Model
- Member Autoconnect for imported Structure
- Loads, Releases, Boundary Conditions for Structural Analysis

Prerequisites:

- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Designer Series
TSMP1100

Length: 10 days
Price: $27,500 Course
On-Site Only

This course is a bundled offering that includes topics from TSMP1001, TSMP1002 and TSMP1003. First week of this course is same as TSMP1001, followed by Electrical Modeling and Structural Modeling topics during second week. It is assumed that students from electrical and structural disciplines would attend the Common App and Equipment Modeling topics in the first week and then rejoin the class in second week. An alternative schedule can accommodate structural users in the first week and electrical and piping users the second week. This course is best suited for a team that would become core Smart 3D team for execution of Smart 3D pilot or roll-out activities.

Major Topics:

- Overview of Common Graphics Environment
- Workspace / Filter Definitions
- Equipment Modeling
- Piping Modeling
- Electrical Modeling
- Structural Modeling

Prerequisites:

- Knowledge of Plant Design & Engineering
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Creating and Editing Drawings Using SmartSketch TSKT 1500

Length: **3 days**
Price: $8,250 Course
$1,650 Enrollment

This course will introduce the student to skills that can increase productivity and streamline design time. It covers tools and procedures in SmartSketch that can be used to create quick sketches, engineering designs, production drawings, plot plans, schematics, business diagrams, and more. It consists of a classroom lecture and lab format that provides the most practical and efficient hands-on reinforcement in the use of these tools and procedures.

Major Topics:

- SmartSketch Environment - Differences between SmartSketch and SmartSketch Drawing Editor
- Drawing Environment - Toolbars and Ribbon Bars
- Drawings Files vs. SmartSketch Files
- Documents, Sheets, and Layers, Creating and Modifying Styles,
- Creating Graphics, Drawing with PinPoint
- Selecting, Finding, and Modifying Graphics
- Dimensioning and Measurement Tools
- Text and Annotations
- Basic Symbol Creation
- Drawings Revision Workflow
- Editing/Drawing Tips.

Prerequisites:

- One of the Smart 3D Modeling courses (TSMP1001, TSMP1002, or TSMP1003)
- Must be taken before or together with TSMP1006

Smart 3D Drawing Creation
TSMP1006

Length: 2
Price: $5,500 Course
$1,100 Enrollment

This course is for designers involved in the generation of orthographic drawings from the Smart 3D model. The course starts with conceptual explanation of the different types of drawings followed by the workflows for generating drawings and editing drawings.

Major Topics:

- Drawing Console
- Composed Drawings
- Volume Drawings
- Creating & Updating Drawings
- Section and Detail Views
- SmartSketch Drawing Editor
- Scaled Sketching
- Manual Labels and Dimensions

Prerequisites:

- One of the Smart 3D Modeling courses (TSMP1001, TSMP1002, or TSMP1003)
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Drawing Configuration
TSMP2001

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for Application Specialists involved in the configuration and generation of orthographic drawings from the Smart 3D model. The course starts with workflows for generating drawings and editing drawings, followed by various configuration and customization techniques. Note: The first two days of this course coincide with TSMP1006.

Major Topics:

- Drawing Console
- Creating & Updating Drawings
- Drawing Editor
- Smart Labels
- Drawing Templates
- Bulkload Utility
- Drawing Types (Snapshot, Volume & Drawings by Query)

Prerequisites:

- One of the Smart 3D Modeling courses (TSMP1001, TSMP1002, or TSMP1003)
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Report Configuration
TSMP2005

Length: 4 days
Price: $11,000 Course
$2,200 Enrollment

This course is for Application Specialists involved in the customization of reports form Smart 3D databases. The course starts with workflows for generating reports, followed by various configuration and customization techniques.

Major Topics:

- Defining New Reports
- Understanding the data model
- Report Definitions/Excel Data
- Creating Report Templates
- Labels

Prerequisites:

- One of the Smart 3D Modeling courses (TSMP1001, TSMP1002, or TSMP1003)
- Knowledge of Databases and SQL statements
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Isometric Drawings
TSMP2002

Length: 4 days
Price: $11,000 Course
$2,200 Enrollment

This course is for Application Specialists involved in the configuration and generation of piping isometric drawings. The course starts with workflows for generating isometric drawings, followed by various configuration and customization techniques.

Major Topics:

- Drawing Console
- Creating & Updating Piping Isometrics
- Isogen Options
- Atext (Alternate Text) Definitions
- Symbols and Symbol keys
- Customizing Isometric Drawing Styles
- Configuring Isometric Drawing Content

Prerequisites:

- Smart 3D Piping & Equipment Modeling course (TSMP1001)
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Configuration of Integrated Environment with Smart 3D and Schematic Tools
TSMP2050

Length: 4.5 days
Price: $13,750 Course
$2,700 Enrollment

This course is to introduce tool administrators to workflows for transferring engineering data across schematic tools for consumption in Smart 3D and configuration of the tools to enable these workflows.

Major Topics:

- Integration Overview
- Enumerated Lists and Property Definitions
- Adding New Equipment Type
- Retrieve Process Data for Equipment
- Adding New Piping Component Type
- Retrieve a New DDP Instrument
- Roundtrip Cable Integration with SmartPlant Electrical
- Publishing 3D Catalog Properties and Document Properties

Prerequisites:

- Knowledge of Smart 3D and Schematic Design Tools

Smart 3D Setup & Administration
TSMP3001

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for System Support personnel who are familiar with the Windows Operating System, networking, and databases, and who will be responsible for loading and configuring the software, keeping the system running, and trouble-shooting problems. Project Support personnel, who will be configuring the software, will also benefit from this course, which includes topics such as software setup, database setup, configuring access control, project level settings. The course is in a lecture/lab format.

Major Topics:

- Overview of Smart 3D System Architecture
- Database Wizard
- Project Management Environment
- Managing Plants
- Backup & Restore
- Access Control and Approval Status
- Work-share Setup
- Common Environment
- Systems & Specs
- Filters
- Session Templates
- Space Management
- Interference Checker Server

Prerequisites:

- Supporting Windows Operating System
- Experience with Microsoft SQL Server
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Equipment & Piping Reference Data TSMP3002

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for Application Specialists involved in the configuration of reference data for Equipment and Piping modeling. This course concentrates on the most common workflows, such as adding a new component to the piping specification, adding new catalog equipment, creating a piping specification, and modifying the delivered catalog data. These workflows are presented in lecture/lab format providing insights into the reference data structure along the way.

Major Topics:

- Catalog & Specification Databases
- Bulkload Utility
- General Format of Bulkload Files
- Adding New Equipment to the Catalog
- Creating a New Piping Materials Class
- Adding a New Piping Component to a Specification
- Adding a New Part to the Catalog
- Piping Specification Rules

Prerequisites:

- Smart 3D Piping & Equipment Modeling course (TSMP1001)
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Electrical Reference Data
TSMP3003

Length: 2 days
Price: $5,500 Course
$1,100 Enrollment

This course is for Electrical Discipline Specialists who will create Electrical reference data.

Major Topics:

- Catalog & Specification Databases
- Bulkload Utility
- General Format of Bulkload Files
- Adding a New Part to the Catalog
- Cableway Specifications
- Cabletray Specifications
- Cable Specifications
- Conduit Specifications

Prerequisites:

- Smart 3D Electrical Modeling course (TSMP1002)
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D Structural Reference Data
TSMP3004

Length: 2 days
Price: $5,500 Course
$1,100 Enrollment

This course is for Structural Discipline Specialists who will create structural reference data.

Major Topics:

- Catalog & Specification Databases
- Bulkload Utility
- General Format of Bulkload Files
- Symbol 2D
- Adding User Defined Sections
- Adding a New Slab Type

Prerequisites:

- Smart 3D Structural Modeling course (TSMP1003)
- Familiarity with Windows User Interface
- Knowledge of 3D Plant Design CAD Concepts

Smart 3D PDS Spec Translation Workshop TSMP3006

Length: 3 days
Price: $8,250 Course

This workshop is for Application Specialists involved in the configuration of reference data for Equipment and Piping modeling. During this workshop a sample set of PDS piping specifications will be translated to Smart 3D, followed by testing of specifications within Smart 3D. A small part of this workshop involves a presentation on translation procedure. Remaining part is designed to be one-on-one instruction and hands-on training using customers data.

Major Topics:

- Overview of Translation Process
- Translation Rules
- Prepare PDS Dataset
- Translation Process
- Review Logs
- Prepare Smart 3D Dataset
- Testing of Translated Data

Prerequisites:

- Smart 3D Piping & Equipment Reference Data course (TSMP3002)

Smart 3D Global Work share Setup – SQL Server TSMP3005

Length: 4.5 days
Price: $13,750 Course

This course is for Application Specialists involved in setting up and maintaining global work share configuration (GWC) for Smart 3D. Objective of this workshop is to create a fully configured GWC setup and test various administrative and end user workflows. This course is based on SQL Server 2014 database system.

Major Topics:

- Overview of GWC
- Planning GWC Setup
- GWC Setup Workflow
- Maintaining GWC Setup
- GWC Impacts on Smart 3D User Workflows
- Consolidation
- Backup Restore Strategies

Prerequisites:

- Smart 3D Setup & Administration (TSMP3001)
- Working Knowledge of SQL Server 2014 Database Administration

Smart 3D Global Work share Setup - Oracle TSMP3007

Length: 4.5 days
Price: $13,750 Course

This course is for Application Specialists involved in setting up and maintaining global work share configuration (GWC) for Smart 3D. Objective of this workshop is to create a fully configured GWC setup and test various administrative and end user workflows. This course is based on Oracle 10g database system.

Major Topics:

- Overview of GWC
- Planning GWC Setup
- GWC Setup Workflow
- Maintaining GWC Setup
- GWC Impacts on Smart 3D User Workflows
- Consolidation
- Backup Restore Strategies

Prerequisites:

- Smart 3D Setup & Administration (TSMP3001)
- Working Knowledge of Oracle 12c Database Administration

Hangers and Supports Maintenance & Customization TSMP-3008

Length: 5 days
Price: $13,750 Course

This course is for application specialists who will work with pipe supports, including maintenance and customization of support libraries. The course starts with explanation of H&S related excel workbooks, followed by various customization techniques. This course is presented as a combination of lecture sessions followed by hands-on activity periods.

Topics Covered:

- Excel workbooks
  - Parts
  - Assemblies
  - Codelists
  - Steel
- Code Overview
  - Parts
  - Assemblies
- Support Customization
  - Excel – Change data, add new row, etc
  - Excel – SmartPart Customization
  - Code – Change pipe size rule, BOM, etc
  - Miscellaneous – Changing values of codelist, adding a new codelist, etc

Prerequisites:

- S3D Reference Data Training
- Microsoft Excel
- Knowledge of SQL

Smart 3D Programming I (Part Symbols, Rules and Report Queries) TSMP4001

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for Application Specialists involved in the configuration of reference data for Smart 3D. This course concentrates on naming rules, symbol definitions for piping items, interference rules and report query interpreter. Naming rules allow automatic naming of objects during placement and modification based on user defined logic. Course involves extensive use of Visual Basic .NET development environment. Course is presented in lecture/lab format.

Major Topics:

- Smart 3D Symbol Creation Concepts
- Geometry Creation Reference
- General Format of Bulkload Files
- Navigating Data Model using Schema Browser
- Creating naming rules
- Creating interference rules
- Creating report query interpreter

Prerequisites:

- Understanding of Smart 3D Reference Data gained through TSMP3002 or TSMP3003
- Working knowledge of Visual Basic .NET Programming and Visual Studio 2013 development environment

Smart 3D Programming II (Equipment Symbols and Forms)
TSMP4002

Length: 3 days
Price: $8,250 Course
$1,650 Enrollment

This course is for Application Specialists involved in the configuration of reference data for Smart 3D. This course concentrates on symbol definitions and user defined forms for equipment. Course involves extensive use of Visual Basic .NET development environment. Course is presented in lecture/lab format.
Major Topics:

- Smart 3D Symbol Creation Concepts
- Geometry Creation Reference
- Creating Equipment Symbols
- Creating Equipment Component Symbols
- Creating User Defined Forms

Prerequisites:

- Understanding of Smart 3D Reference Data gained through TSMP3002 or TSMP3003
- Working knowledge of Visual Basic .NET Programming and Visual Studio 2013 development environment

Smart 3D Automation with .NET
TSMP4003

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course is for Application Specialists involved in the development of Automation for Smart 3D applications. The course starts with concepts of the S3D .NET API, explains what kind of Automation can be developed and further elaborates on the Programming Model and the available Services/Components for use in developing Automation components.

Major Topics:

- S3D .NET API Architecture
- Developing Custom Commands
- Standalone Applications
- Access Metadata – Classes, Interfaces, Attributes, Relationships, Navigate Relationships
- Creating and Modifying Smart 3D objects e.g. Filters, Systems, Equipment, Piping, Spaces

Prerequisites:

- One of the Smart 3D Modeling courses (TSMP1001, TSMP1002 or TSMP1003)
- Knowledge of 3D Plant Design CAD Concepts.
- Programming Knowledge – .NET language like VB.NET or C#.

Smart 3D Programming III (Stair, Ladder and Handrail Symbols)
TSMP4005

Length: 2 days
Price: $5,500 Course
$1,100 Enrollment

This course is for Application Specialists involved in the configuration of reference data for Smart 3D. This course concentrates on symbol definitions for stairs, ladders and handrails. Course involves extensive use of Visual Basic .NET development environment. Course is presented in lecture/lab format..

Major Topics:

- Smart 3D Symbol Creation Concepts
- Geometry Creation Reference
- Creating Stair Symbols
- Creating Ladder Symbols
- Creating Handrail Symbols

Prerequisites:

- Understanding of Smart 3D Reference Data gained through TSMP2003
- Working knowledge of Visual Basic .NET Programming and Visual Studio 2013 development environment

Smart 3D Piping, Electrical and Equipment Symbol Programming

TSMP4006

Length: 4.5 days
Price: $13,750 Course
$2,750 Enrollment

This course concentrates on symbol definitions for piping and electrical parts and symbol definitions and user defined forms for equipment. Course involves extensive use of Visual Basic .NET development environment. Course is presented in lecture/lab format.
Major Topics:

- Smart 3D Symbol Creation Concepts
- Geometry Creation Reference
- Creating Piping Symbols
- Creating Electrical Symbols
- Creating Equipment Symbols
- Creating Equipment Component Symbols
- Creating User Defined Forms

Prerequisites:

- Understanding of Smart 3D Reference Data gained through TSMP3002 or TSMP3003
- Working knowledge of Visual Basic .NET Programming and Visual Studio 2013 development environment

Hangers and Supports Part & Assembly Creation TSMP4004

Length: 4.5 days
Price: $13,750 Course

Major Topics:

- Symbols (Parts) – I.5 Day
  - Symbol Data Overview
  - Symbol Code
  - Understanding Symbol Ports
  - Drawing Shape Primitives
  - Part Selection Rules
  - SmartParts
- Supports (Assemblies) – 2.5 Days
  - Assembly Data Overview
  - Assembly Code
  - Understanding Reference Ports
  - Understanding Bounding Boxes
  - Joints & Constraints
- Supplementary – 1 Day
  - Hanger Service Classes
  - Hanger Rule
  - BOM Definition
  - Labels
  - Dimension Points
  - Local Coordinate Systems

Prerequisites: TSMP3008: H&S Customization
Microsoft Excel
Intermediate to Advanced programming skills in C#
Knowledge of SQL queries

This course is intended for application specialists or software developers who wish to create & customize S3D Hangers & Supports at the programmatic level. Trainees will acquire the skills required to be proficient in creating Supports (Assembly Information Rules) along with the Parts (Symbols) & Rules (Part/Assembly Selection Rules) that drive them. Trainees must have past coding experience (preferably in C#). This course is presented as a combination of lecture sessions followed by hands-on activity periods.