Training Content

Dynamic Modelling with Modelica and FMI

DAY 1

MODULE 1: Dynamic Modelling with Modelica - Fundamentals

Presentation: Introduction to Modelica modelling environment **1 h**

Model Specifications/Requirements of User-Defined Models (UDM). RMS- and EMT-domain simulations.

Generic and vendor-specific UDMs. Simplified and detailed models.

Overview of the Modelica Language and the Modelica Language Specification.

Graphical and scripted modelling environment for Modelica models within *PowerFactory*.

Exercise: Hands-on experience with a simple Modelica model **½ h**

View, understand and parameterise a model.

Run a simulation and plot Modelica model signals.

Coffee break

Exercise: Development of a basic Modelica model **1 ½ h**

Create, debug and parameterise a simple controller model.

Steady state operation: setting initial conditions of the developed model.

Dynamic simulation: controller response and analysis.

Q&A session

Lunch break

MODULE 2: Development and integration of time-discrete Modelica models

Model development: workflow and tools for creation of complex UDMs **¾ h**

High-level Control System Representation of UDMs.

Control systems: Fundamentals; time-continuous and time-discrete models.

Model structure: Type Instances/Submodels, algorithms, parameterisation, initialisation.

Model flexibility: data types, scalar/array variables, conditional components.

Exercise: Develop a controller for power electronics (PE) converter system **¾ h**

Create, debug and parameterise a control system for a converter based generator.

Operating with array signals in Modelica models and in the Composite Model Frame.

Coffee break

Exercise (continued): Develop a controller for a PE converter system **1½ h**

Steady state operation: setting initial conditions of the developed model.

Debugging/analysis of model behaviour for various operation scenarios.

Q&A session

DAY 2 (Half-day)

Exercise (continued): Develop a controller for a PE converter system **1½ h**

Dynamic simulation: controller response and analysis.

Creating a complete power equipment simulation model by means of a general template.

Coffee break

MODULE 3: The Functional Mock-up Interface (FMI)

FMI as a comprehensive solution for model exchange in power systems **¾ h**

Vendor-independent, tool-independent model interfacing for simulation of power system components.

FMI as a common standard for exchanging dynamic models between OEMs and Utility operators. Tools supporting FMI.

Functional Mock-up Units (FMUs): structure, specifications, data protection and cross-platform compliancy.

FMI Import: Integration of FMUs within *PowerFactory*.

FMI Export: Exporting *PowerFactory* Modelica models as FMUs

Exercise: Integration into *PowerFactory* of an FMU-based controller for PE converters **¾ h**

Set-up and configuration of the FMU (FMU Import)

Troubleshooting cases, simulation settings and compatibility requirements.

Q&A session

PF2024

Time Schedule (Central European Time)

Full-Day	Time
First 90 minutes block	9:00
Coffee break	10:30
Second 90 minutes block	10:45
Q&A session	12:15
Lunch break	12:30
Third 90 minutes block	13:30
Coffee break	15:00
Fourth 90 minutes block	15:15
Q&A session	16:45
End of the training day	17:00

Half-Day	Time
First 90 minutes block	9:00
Coffee break	10:30
Second 90 minutes block	10:45
Q&A session	12:15
End of the training day	12:30

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