DIgSILENT Simulation Language (DSL)

DAY 1

MODULE 1: Dynamic Modelling Approach in *PowerFactory*

Dynamic Modelling Approach in *PowerFactory* $^1/_2$ h

Fundamentals. Dynamic modelling in practice.

Exercise: Dynamic Modelling Approach $^1/_2$ h

Identify and familiarise with dynamic controls and connection patterns associated to grid elements.

Dynamic Modelling Handling $^1/_4$ h

Model type/elements handling. Identification of DSL model and Composite model.

Exercise: Include Dynamic Models in a Network $^1/_4$ h

Definition of dynamic models from standard model definitions and composite models.

Coffee break

MODULE 2: Dynamic Modelling Concepts

Dynamic Modelling Concepts $^1/_2$ h

Interpret and visualise a functional block diagram. Identify the transfer function in a block diagram.

Exercise: Interpret a Block Diagram $^1/_4$ h

Investigate a block diagram.

MODULE 3: Introduction to DSL and Graphical Modelling

Introduction to DSL and Graphical Modelling $^3/_4$ h

Implementation of models via graphical interface. General considerations of DSL.

Q&A session

DAY 2

Exercise: Model Definition of a Voltage Controller $^1/_2$ h

Usage of the standard macros to build a block diagram to represent an excitation system. Definition of a frame diagram.

Dynamic Model Initialisation $^1/_2$ h

Initialisation concept and procedure. Dynamic model definition: DSL model and composite model.

Exercise: Initialisation of the Voltage Controller Model $^1/_2$ h

Definition of the initial conditions for the excitation system.

Coffee break

Composite Frame Implementation $^1/_4$ h

Definition of composite frame. Identification of signal names in a composite frame.

Implementation of the Voltage Controller Model and Test $^3/_4$ h

Define the composite model and test the voltage controller.

MODULE 4: Dynamic Model Templates

Dynamic Model Templates $^1/_4$ h

Packing and re-using models. Template definition.

Exercise: Define and Use a Generator Set Template $^1/_4$ h

Define a template for a generator set and applying it.

Q&A session

DAY 3

MODULE 5: DSL Syntax and Transfer Function Macro

DSL Syntax and Transfer Function Macro $^1/_2$ h

DSL syntax and coding. DSL standard and special functions. Write transfer function using DSL code.

Exercise: Implement a Transfer Function Macro $^1/_2$ h

Create a macro and familiarise with DSL coding.

Coffee break

MODULE 6: Dynamic Modelling of Generator Controls in *PowerFactory*

Exercise: Complete Plant Control Model   1 $\frac{1}{2}$ h

Use graphical interface and DSL coding. Implement a complete controller for a synchronous generator.

Q&A session

DAY 4

Continuation Exercise: Complete Plant Control Model   1 $\frac{1}{2}$ h

Find the initial conditions for the different models and test.

Coffee break

MODULE 7: Dynamic Modelling Auxiliary Elements and DSL Features

Dynamic Modelling Auxiliary Elements and DSL Features $\frac{1}{2}$ h

Usage of station measurement elements. DSL event function. Special frame features.

Exercise: Simple Undervoltage Relay $\frac{1}{2}$ h

Implement an undervoltage load-shedding relay using DSL and test it. Usage of the special event function.

MODULE 8: Additional Exercises

Optional Exercises   1 h

Modelling, initialisation and test of the following models:
    Dynamic Load Model
    Switched Shunts
    Simple PV Plant Model
    Fixed Speed Induction Generator (FSIG) Model

Q&A session

Time Schedule (Central European Time)

	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