

# DigSILENT Simulation Language (DSL)

## October 21<sup>st</sup> - Oct 22<sup>nd</sup> 2021

Online training course via Zoom

The two-day training “DigSILENT Simulation Language (DSL)” gives an overview of the modelling process in *PowerFactory* using the simulation language DSL. The whole procedure of translating a physical system into a set of mathematical equations and implementing it using DSL will be introduced and practised by the participant.

The course introduces various aspects of the DSL language, including the description of differential equations, issuing simulation events and coding dead-times, giving the participant the opportunity to practice with a wide range of different type of proposed exercises different aspects of DSL modelling. A procedure and guide to establish initial conditions will be exposed and practised.

### WHO SHOULD ATTEND:

The course is intended for

- Utility engineers
- Power system operators
- Project Developers
- Manufacturers
- Consultants and electrical engineers

interested in the modelling of control processes within the power systems.

Participants should be familiar with *PowerFactory* basics and should have experience with *PowerFactory*'s time domain simulation functions.

### PRICE PER PARTICIPANT:

- \$1,312.40 (with valid maintenance contract)
- \$1,480.00 (without valid maintenance contract)
- \$444.00 (with valid student identification)

\* Prices do not include GST.

## Training schedule

Central Standard Time (UTC -06:00)

### DAY 1

- 9:00 Dynamic Modelling Approach in *PowerFactory***  
Fundamentals. Dynamic modelling in practice.
- 9:30 Exercise: Dynamic Modelling Approach**  
Identify and familiarise with dynamic controls and connection patterns associated to grid elements.
- 10:00 Dynamic Modelling Handling**  
Model type/elements handling. Identification of Common model and Composite model.
- 10:15 Exercise: Include Dynamic Models in a Network**  
Definition of dynamic models from standard model definitions and composite models.
- 10:30 Coffee break**
- 11:00 Dynamic Modelling Concepts**  
Interpret and visualise a functional block diagram. Identify the transfer function in a block diagram.
- 11:30 Exercise: Interpret a Block Diagram**
- 11:45 Introduction to DSL and Graphical Modelling**  
Implementation of models via graphical interface. General considerations of DSL.
- 12:30 Lunch break**
- 13:30 Exercise: Model Definition of a Voltage Controller**  
Usage of the standard macros to build a block diagram to represent an excitation system. Definition of a frame diagram.
- 14:00 Dynamic Model Initialisation**  
Initialisation concept and procedure. Dynamic model definition: common and composite model.
- 14:30 Exercise: Initialisation of the Voltage Controller Model**  
Definition of the initial conditions for the excitation system.
- 15:00 Coffee break**
- 15:30 Composite Frame Implementation**  
Definition of composite frame. Identification of signal names in a composite frame.
- 15:45 Exercise: Implementation of the Voltage Controller Model and Test**  
Define the composite model and test the voltage controller.
- 16:15 Dynamic Model Templates**  
Packing and re-using models. Template definition.
- 16:30 Exercise: Define and use a Generator Set Template**  
Define a template for a generator set and applying it.
- 17:00 End of the first day**

### DAY 2

- 9:00 DSL Syntax and Transfer Function Macro**  
DSL syntax and coding. DSL standard and special functions. Write transfer function using DSL code.
  - 10:00 Exercise: Implement a Transfer Function Macro**  
Create a macro and familiarise with DSL coding.
  - 10:30 Coffee break**
  - 11:00 Exercise: Complete a Plant Control Model**  
Use graphical interface and DSL coding. Implement a complete controller for a synchronous generator.
  - 12:30 Lunch break**
  - 13:30 Continuation Exercise: Complete Plant Control Model**  
Find the initial conditions for the different models and test.
  - 15:00 Coffee break**
  - 15:30 Dynamic Modelling Auxiliary Elements and DSL Features**  
Usage of station measurement elements. DSL event function. Special frame features.
  - 16:00 Exercise: Simple Undervoltage Relay**  
Implement an undervoltage load-shedding relay using DSL and test it. Usage of the special event function.
- Optional exercises:**  
Modelling, initialisation and test of the following models:
- Dynamic Load Model
  - Switched Shunts
  - Simple PV Plant Model
  - Fixed Speed Induction Generator (FSIG) Model

**17:00 End of the training course**