

DIG SILENT

Training Courses

Courses	Title	Duration (days)	Languages			
			English	German	Spanish	French
PowerFactory	Basic 1 - Model Creation, Load Flow and Short Circuits	2	✓	✓	✓	✓
	Basic 2 - Network Planning, Variations and Scenarios	1	✓	✓	✓	
	Database Management	1	✓			
	Advanced Handling of PowerFactory	0.5	✓			
	Network Reduction	0.5	✓			
	Contingency Analysis	1	✓	✓	✓	
	Overcurrent Protection	1	✓	✓	✓	
	Distance Protection	1	✓	✓	✓	
	Protection Advanced Course	1	✓	✓		
	Arc Flash Calculation	0.5	✓	✓		
	Power Quality and Harmonic Analysis	1.5	✓	✓	✓	✓
	Grid Connection of Renewable Generation	2	✓	✓	✓	
	Grid Connection of Photovoltaic Generation	2	✓			
	Transmission Network Tools	1	✓		✓	
	Distribution Network Tools	1	✓			
	Reliability analysis	2	✓			
	Optimal Power Flow (OPF)	1	✓			
	Stability Analysis	2	✓		✓	
	Introduction to RMS Simulation	1	✓			
	Electromagnetic Transients (EMT)	3	✓	✓		
	Dynamic Simulation Language (DSL)	2	✓		✓	
	Power System Stabiliser (PSS) Tuning	2	✓		✓	
	Motor Starting Methods	1	✓			
	Flexible AC Transmission Systems (FACTS)	1	✓			
	Power Transmission with HVDC	3	✓			
	DPL Introductory Course	1	✓		✓	
	DPL Advanced Course	1	✓		✓	
	Scripting with Python in <i>PowerFactory</i>	2	✓	✓	✓	
	QDSL Models	1.5	✓	✓		
	Generation Adequacy	1	✓			
Introduction to CIM	0.25	✓				
StationWare	Working with StationWare	1	✓			
	StationWare Administration	2	✓			

Course Details - PowerFactory

Basic Training Part 1 - Model Creation, Load Flow and Short-Circuit Calculations


Objectives: This course offers an introduction to the basic features of the DlgSILENT *PowerFactory* software, including building a small network and carrying out load flow and short circuit calculations.

Course Content:

- Introduction to *PowerFactory*: Fundamental concepts, functionality, handling and terminology.
- Creation of a network model: The process of building a network model from scratch, including an introduction to the concept of Type objects, used for data obtained from manufacturers' datasheets.
- Load Flow calculation: Basic concepts of load flow analysis in *PowerFactory*. Execution of load flow calculations and reports.
- Voltage control in load flow calculations.
- Further network modelling, including the use of templates.
- Short Circuit calculation: Understanding the implementation of short-circuit calculations in *PowerFactory*.
- Connecting grids: Simple methods for connecting grids within a project.

Target audience: Electrical engineers new to *PowerFactory*

Prerequisites: No previous experience with *PowerFactory* is required.

Duration:  2 days

Available in:  EN ;  DE ;  ES ;  FR

Basic Training Part 2 - Network Planning, using Variations and Operation Scenarios

Objectives: This course aims to build on the knowledge acquired in the Basic Training Part 1, by improving the user's understanding of the *PowerFactory* data structure and how features such as network variations and operation scenarios can be used to analyse different network configurations and operating conditions.




Course Content:

- Understanding basic concepts of the data structure in a *PowerFactory* project and in particular the roles of Network Variations, Study Cases and Operation Scenarios.
- Introduction to the concept of network model versioning and derived projects.
- Modelling network expansions using a Network Variation and Expansion Stages.
- Using Operation Scenarios and Study Cases.
- Modelling loads in a medium voltage grid: Feeder Load Scaling, Voltage Profiles and the use of Quasi Dynamic Simulation to carry out load flows for multiple time points.

Target audience: Electrical engineers new to *PowerFactory*, or with limited experience.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN ;  DE ;  ES

Database Management

Objectives: This course focusses on the multiuser database, the creation of users accounts and associated access rights, and the use of user-specific profiles. Derived projects and the compare and merge tool are presented and used.


Course Content:

- The user manager tool, publishing users and user groups: the different types of user are presented, user groups are created and licences are assigned to specific users.
- Profiles: the use of the *PowerFactory* predefined profiles is shown and a user-specific profile is prepared and assigned.
- Handling of projects: sharing of projects, description and handling of master and derived projects.
- Compare and merge tool: presentation of the merge tool and exercises for comparison of projects, two way merging of projects and three way merging of projects.

Target audience: Multiuser database managers and users.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1, and should understand the *PowerFactory* database structure.

Duration:  1 day

Available in:  EN

Advanced Handling of *PowerFactory*

Objectives: This training covers topics related to the advanced handling of *PowerFactory*, including graphical representations and the advanced use of variations, expansion stages and scenarios.

Course Content:

- Creation and customisation of overview, geographical, simplified and detailed single line diagrams.
- Diagram Layout Tool.
- Customised substation template.
- Handling of operation scenarios: comparing, “hidden” objects, scenario subsets, selective updating.
- Running arrangements.
- Merging and splitting expansion stages.

Target audience: Existing users who would like to delve into the advanced handling of *PowerFactory*.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  0.5 day

Available in:  EN

Network Reduction

Objectives: To learn how to use Boundaries and the Network Reduction command.

Course Content:

- Working with Boundaries. Boundary definition tool.
- Network reduction command and options. (For steady-state analysis only.)
- Evaluation of results and troubleshooting a network reduction.

Target audience: Users interested in using the network reduction tool to simplify networks or remove confidential data.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  0.5 day

Available in:  EN

Contingency Analysis

Objectives: This course covers the concepts and application of Contingency Analysis in *PowerFactory*, including results reporting and some of the extended functions such as Time Sweep and Remedial Action Schemes.




Course Content:

- Overview of the basic concepts and use of Contingency Analysis.
- Single Time Phase Contingency Analysis.
- Multiple Time Phase Contingency Analysis, Effectiveness and post-fault actions.
- Contingency Time Sweep.
- Application of short-term thermal ratings.
- Remedial Action Schemes.

Target audience: The course is intended for any power system engineers interested in the use of the contingency analysis (n-1 calculations) in *PowerFactory*.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN ;  DE ;  ES

Overcurrent Protection

Objectives: This course starts with an overview of state-of-the-art methods and concepts, then the modelling of protective equipment in *PowerFactory* is explained. Using practical examples, the selectivity of overcurrent protection devices in industrial and medium voltage distribution networks is demonstrated, and the simulation of directional overcurrent protection devices, reverse interlocking and differential protection is practised. The course ends with a practical exercise dealing with the definition of fuse melting curves.




Course Content:

- Fundamentals of Overcurrent Protection.
- Handling of *PowerFactory*'s Overcurrent Protection Function.
- Practical Exercises.

Target audience: Planning, operation and project engineers whose duties involve the coordination, adjustment and testing of overcurrent protective devices in low-, medium- or high-voltage systems.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN ;  DE ;  ES

Distance Protection

Objectives: This course provides an overview of the fundamentals of the distance protection and coordination package and hands-on experience of the relevant functions through practical exercises. The modelling of commonly used protective equipment in *PowerFactory* is also explained. The participant will acquire a deeper understanding of subjects such as: Modelling of distance protection relays in *PowerFactory*, automatic distance protection coordination and setting rules for the protection zones of distance protection relays. Creation of R-X plots and time distance diagrams will be covered, as well as modelling of different intertripping schemes and starting methods.




Course Content:

- Fundamentals of Distance Protection and Coordination.
- Handling of *PowerFactory*'s specific Functions.
- Practical Exercises.

Target audience: The course is intended for Planning, operation and project engineers whose duties involve the coordination, adjustment and testing of distance protective devices in medium or high voltage systems.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Knowledge of overcurrent protection fundamentals and their application in *PowerFactory* is also necessary; therefore the Overcurrent Protection course is recommended.

Duration:  1 day

Available in:  EN ;  DE ;  ES

Protection Advanced Course

Objectives: In this training users learn how to examine the performance of a protection system in a highly automated manner, fully configurable. The purpose the analysis presented here is to give confidence to users that their protection schemes perform in accordance with their particular coordination and operation criteria and to identify any weaknesses or failures in a scheme's performance. The training also provides an overview of the fundamentals behind the relay modelling.

Course Content:

- Fundamentals of Distance Protection and Coordination.
- Handling of *PowerFactory*'s specific Functions.
- Practical Exercises.

Target audience: The course is intended for planning, operation and project engineers whose duties involve the coordination, adjustment and testing of protective devices.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Knowledge of overcurrent protection fundamentals and their application in *PowerFactory* is also necessary; therefore the Overcurrent Protection course is recommended.

Duration:  1 day

Available in:  EN ;  DE

Arc Flash Calculation

Objectives: This training covers tools available in *PowerFactory* to perform arc-flash hazard analysis, including their technical background, descriptions of the Arc-Flash Hazard Analysis command and Arc-Flash Reports dialogs. By the end of the training participants should be able to determine employee Personal Protective Equipment (PPE) requirements using *PowerFactory*.

Course Content:

- Introduction to Arc Flash Calculation.
- Estimating Incident Energy and PPE.

Target audience: The course is intended for planning and project engineers interested in personal protection and safety in medium voltage systems.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Knowledge of overcurrent protection fundamentals and their application in *PowerFactory* is also necessary; therefore the Overcurrent Protection course is recommended.

Duration:  0.5 day

Available in:  EN;  DE

Power Quality and Harmonic Analysis

Objectives: This course is dedicated to power quality assessment with a main focus on harmonic analysis (harmonic load flow calculation) and impedance frequency sweeps for identifying resonance conditions in power systems.

Course Content:

- Introduction to Harmonics.
- Modelling of harmonic sources and power system components including frequency dependencies in *PowerFactory*.
- Harmonic Load Flow Calculation.
- Impedance frequency sweeps.
- Harmonic filter design.
- Power quality assessment according to IEC.
- Network Impedance Loci.

Target audience: The course is aimed at power system engineers interested in power quality, especially in harmonics analysis, in the frequency domain models and the power quality simulation tools available in *PowerFactory*. The course is suitable in particular for network operators, installation planners, equipment developers and researchers.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Experience of *PowerFactory*'s frequency domain simulation functions is not required.

Duration:  1.5 days

Available in:  EN ;  DE ;  ES ;  FR

Grid Connection of Renewable Generation

Objectives: This course provides a comprehensive overview of generic wind generator models and generic photovoltaic models in DlgSILENT *PowerFactory*, and their use in load flow, short-circuit, harmonic and dynamic analyses. It covers the following generation technologies: wind-turbine generators (WTG) with fully rated converter, WTG with doubly fed induction machine and photovoltaic systems.

Course Content:

- Basics of Wind and Photovoltaic Systems.
- Modelling Wind Turbine Generator Concepts in *PowerFactory*.
- Modelling Photovoltaic Systems in *PowerFactory*.
- Reactive Power Analysis (PQ and VQ curves).
- Harmonic Load Flow (IEC 61000).
- Short-Circuit Analysis (IEC 60909:2016).
- Introduction to Stability Functions.
- Using IEC 61400-27-1 WTG models.
- Practical Exercises with Wind and Photovoltaic Models.

Target audience: Power systems professionals involved in planning and operation of renewable generation.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Knowledge of DSL modelling is not needed.

Duration:  2 days

Available in:  EN;  DE ;  ES

Grid Connection of Photovoltaic Generation


Objectives: This course provides a comprehensive overview of renewable generation with focus on photovoltaic systems and their use in various applications. The most commonly used analysis procedures are presented and practised using DIgSILENT *PowerFactory*, covering the following topics: steady state analysis, short-circuit calculations at plant level, harmonic analysis according to IEC and transient stability analysis (e.g. FRT/LVRT behaviour). Where relevant, the exercises will take into account the ENTSO-E guidelines for grid connection of renewable generation.


Course Content:

- Basics of Photovoltaic Systems.
- Generator Concepts in *PowerFactory*.
- Harmonic Load Flow and Short-Circuit Analysis.
- Introduction to Stability Functions.
- Practical Exercises with Photovoltaic Simulation Models.

Target audience: *PowerFactory* users wishing to understand the operation of renewable energy systems and their interaction with the power system.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Knowledge of DSL (*DIgSILENT* Simulation Language) and user defined dynamic modelling is not needed.

Duration:  2 days

Available in:  EN

Transmission Network Tools

Objectives: This course offers an introduction to the use of the tools available in *PowerFactory* for typical analyses of transmission networks.

Course Content:

- PV Curves & QV Curves: handling of the tools and analysis of results; the PV curves and QV curves are typically used for steady state voltage stability studies.
- Transfer Capacity Analysis: handling of the tool used to determine the maximum power to be transferred between two areas of the network.
- Power Transfer Distribution Factors: calculation of the PTDF and analysis of results.

Target audience: *PowerFactory* users interested in executing studies in transmission networks.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN ;  ES

Distribution Network Tools

Objectives: This training is designed for users in the distribution sector who wish to streamline their daily processes using the tools available within *PowerFactory*. The course starts with an overview of the distribution network tools, including a description of the relevant models, then continues with sections dedicated to each of the available distribution functions.

Course Content:

- The Medium-Voltage Load model.
- The Low-Voltage Load model.
- Feeders and their applications.

- Tie Open Point Optimisation.
- Voltage profile Optimisation.
- Optimal Capacitor Placement.
- Phase Balance Optimisation.

Target audience: Power systems professionals from the distribution sector.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN

Reliability Analysis


Objectives: This course offers an introduction to the principles and application of Reliability Analysis with *PowerFactory*. After participating in the training the network planner will be able to carry out Reliability based decisions especially guided by comparison of different measures.

Course Content:

- Presentation of basic principles of probabilistic Reliability Analysis.
- Differentiation of deterministic planning criteria and classical (n-1) calculation.
- Familiarisation with the relevant data and models of operating resources.
- Introduction and comparison of different possibilities for Reliability Assessment in *PowerFactory*.
- Validation, Analysis and Techno-Economical assessment of the determined results.

Target audience: Power systems professionals involved in network planning and operation.

Prerequisites: Participants should be familiar with the handling of *DIGSILENT PowerFactory*, based on completion of the Basic Training Part 1 course, together with practical experience with *PowerFactory* software.

Duration:  2 days

Available in:  EN

Optimal Power Flow (OPF)

Objectives: In this course the participants are introduced to calculating Optimal Power Flow (OPF) using *PowerFactory*. Objective functions, system constraints and control variables are presented for each optimisation method. The concepts of marginal price and shadow price are also discussed. Practical experience is gained through exercises such as “OPF in a Transmission System”.

Course Content:

- Introduction into Optimal Power Flow
- AC Optimisation Method (Interior Point Method)
- DC Optimisation Method (Linear Programming)
- Contingency Constrained DC Optimisation (LP Method)
- Practical Exercises

Target audience: Power systems professionals involved in network planning and operation.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN

Stability Analysis


Objectives: This course provides a comprehensive overview of power system stability and control. The dynamic modelling and simulation environment of *PowerFactory* are introduced. It includes a presentation of the mathematical models of synchronous generators, induction machines, loads, excitations systems, turbines and governing systems. Participants perform numerous exercises, in which they investigate the stability of single-machine and multi-machine power systems, using time-domain and frequency-domain techniques.

Course Content:

- Fundamentals of Power System Stability.
- Network models for dynamic analysis.
- Time domain analysis (RMS) using *PowerFactory*.
- Transient Stability.
- Oscillatory Stability (small signal).
- Voltage Stability.
- Frequency Stability.

Target audience: Utility engineers, power system operators, project developers, manufacturers, consultants and electrical engineers in general, interested in stability analysis of networks.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Experience with *PowerFactory*'s time domain simulation functions is not required and will be introduced in the course.

Duration:  2 days

Available in:  EN ;  ES

Introduction to RMS Simulation

Objectives: This course presents an introduction to the dynamic modelling and simulation environment in *PowerFactory*.

Course Content:

- Calculation of initial conditions.
- Definition of Variables.
- Events definition.
- Result visualisation.
- Simulation Scan.
- Frames and Composite Models.
- Use of Standard Models from the Global Library.

Target audience: Any *PowerFactory* users interested in executing dynamic simulations.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN

Electromagnetic Transients (EMT)

Objectives: This course is dedicated to power system transients and their analysis by means of time domain simulations.

Course Content:

- Introduction to electromagnetic transients in power systems including temporary, slow front and fast front overvoltages.
- Time domain simulations in *PowerFactory*.

- Representation of power system elements for electromagnetic transients.
- Transformer Energisation.
- Capacitor Switching.
- Breaker TRV studies.
- Overhead line and cable switching including stochastic analysis.
- Lightning Transients.

Target audience: The course is aimed at power system engineers interested in the use of the electromagnetic transients (EMT) simulation function of *PowerFactory*.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Experience of *PowerFactory*'s time domain simulation functions is not required.

Duration:  3 days

Available in:  EN ;  DE

Dynamic Simulation Language (DSL)


Objectives: The whole process of translating a control system into a set of mathematical equations and implementing it using the *PowerFactory* simulation language DSL (*DigSILENT* Simulation Language) is introduced and practised. Aspects of the DSL language, such as the description of differential equations, issuing simulation events, coding dead-times, model initialisation etc. will be introduced systematically, with extensive practice in the implementation of various DSL models.

Course Content:

- Introduction to DSL.
- Developing Models in DSL.
- Initial Conditions Calculation.
- Practical Exercises: Dynamic Loads, Under-voltage Relays, Switched Shunts etc.

Target audience: The course is recommended to all *PowerFactory* users performing dynamic simulations (RMS/EMT).

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1, and be familiar with the *PowerFactory* time domain simulation functions ("RMS-simulation" or "EMT-simulation").

Duration:  2 days

Available in:  EN ;  ES

Power System Stabiliser (PSS) Tuning

Objectives: This course covers the theory of small-disturbance rotor angle stability, and its enhancement using power system stabilisers. *PowerFactory* is used to tune a single-input as well as a dual-input power system stabiliser. A significant part of the course is devoted to exercises. Participants investigate the stability of single-machine and multi-machine power systems, using time-domain and frequency-domain techniques. They tune power system stabilisers with the aid of Bode Plots and Root-Locus Diagrams.

Course Content:

- PSS Basics.
- PSS Phase and Gain Adjustment.
- Dual-input PSS.
- Multi-machine Power Systems.

Target audience: Any power system engineers with responsibilities in areas such as power systems operation and control.

Prerequisites: Participants should be proficient in the use of stability functions of the *PowerFactory* software, acquired through experience or our Stability Analysis training.

Duration:  2 days

Available in:  ES

Motor Starting Methods


Objectives: This course provides an overview of the most common starting methods for induction motors through an initial theoretical background and then practical exercises in *PowerFactory*. Depending on the complexity of the study, the participant will be able to handle both the static and dynamic analysis tools thus giving the possibility of obtaining either fast and accurate enough results or more time consuming but in-depth and precise calculations.


Course Content:

- Basics of Motor Starting Methods.
- Direct and star-delta starting.
- Other methods: Variable rotor resistance; Auto-transformer, series reactor starting.
- Introduction to Variable-Speed Drive driven motors: starting using dynamic simulation.

Target audience: The course is aimed at any power system engineers interested in the subject of AC motor starting techniques and their analysis using *PowerFactory*.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1.

Duration:  1 day

Available in:  EN

Flexible AC Transmission Systems (FACTS)

Objectives: This course provides an introduction to Flexible AC Transmission Systems (FACTS) and its applications. Static VAR compensators (SVCs), STATCOMs and thyristor-controlled series capacitors (TCSCs) are addressed. Topologies and controls, steady-state as well as dynamic behaviour are explained. At the end of the course, the participants will be able to deploy, configure and analyse simulation models of FACTS equipment using *PowerFactory*. Practical use case scenarios are investigated.

Course Content:

- Parallel Compensation with FACTS: SVC/SVS and STATCOM.
- Series Compensation: TCSC.
- Practical applications and analysis using *PowerFactory*.

Target audience: The course is intended for any utility engineers, power system operators, project developers, manufacturers, consultants and electrical engineers in general, interested in FACTS and their application in power systems.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Experience with *PowerFactory*'s time domain and frequency domain simulation functions is recommended but not mandatory.

Duration:  1 day

Available in:  EN

Power Transmission with HVDC

Objectives: This course gives an overview of High-Voltage Direct Current (HVDC) transmission. Line-commutated converters (LCCs) and modular multi-level converters (MMCs) are addressed. Topologies and controls, steady-state, harmonic as well as dynamic behaviour are explained. The participants will learn how to model these systems in *PowerFactory*. Practical use case scenarios are investigated.


Course Content:

- Introduction to HVDC Systems.
- Steady state and dynamic analysis of LCC-HVDC.

- Steady state and dynamic analysis of VSC-HVDC systems (with focus on MMC-HVDC).
- Applications: 50 Hz/60 Hz link, embedded link in 50 Hz grid, offshore wind farm link.

Target audience: This course is intended for any utility engineers, power system operators, project developers, manufacturers, consultants and electrical engineers in general, interested in HVDC and their application in power systems.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Experience with PowerFactory's time domain and frequency domain simulation functions is recommended but not mandatory.

Duration:  3 days

Available in:  EN

DPL Introductory Course

Objectives: This course includes basic concepts and syntax of the DIgSILENT Programming Language (DPL), which is integrated into *PowerFactory* and is commonly used to automate the execution of time-consuming simulations.

Course Content:

- Introduction to DPL.
- Basic DPL Syntax.
- Objects, Sets and DPL Selection.
- Command Execution.
- Reporting Results.

Target audience: The course is aimed at *PowerFactory* users interested in performing automated tasks.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Programming experience is not a prerequisite, but would be beneficial.

Duration:  1 day

Available in:  EN ;  ES

DPL Advanced Course

Objectives: In this course advanced DPL commands are presented.

Course Content:

- Result File Functions.
- External Data Files.
- Table Reports.

Target audience: The course is aimed at *PowerFactory* users interested in performing advanced automated tasks.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1, and have a basic knowledge of the DIgSILENT Programming Language (DPL).

Duration:  1 day

Available in:  EN ;  ES

Scripting with Python in *PowerFactory*

Objectives: Python is a programming language which can be used to control *PowerFactory*. It is commonly used to automate the execution of time-consuming simulations - however, its application extends far beyond that. Python may also be used to process results, or to implement a routine that applies sequential changes to a network and calls *PowerFactory*'s analysis functions in each step.

This course provides a compact and efficient introduction to the fundamental aspects of writing scripts inside of *PowerFactory* using Python. The course includes basic concepts, syntax, accessing and modification of objects from within the code, automation of a series of calculations and presentation of the results etc.


Within the context of the training course numerous scripts will be created, which are intended to encourage new ideas or can be adapted to suit particular requirements.

Course Content:

- Introduction to Python-*PowerFactory* interface.
- Access to *PowerFactory* Objects.
- Execution of *PowerFactory* Commands.
- Navigation through the *PowerFactory* Project.
- Reporting Results, Subroutines and Module.
- Results Files.
- Graphical Representation.
- Import/Export Data to/from External Files.

Target audience: The course is aimed at any *PowerFactory* users interested in performing automated tasks.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1. Experience with *PowerFactory*'s DPL, Python itself, as well as C++, C, Java or other scripting languages is not necessary but would be an advantage.

Duration:  2 day

Available in:  EN;  DE ;  ES

QDSL Models

Objectives: QDSL is a powerful modelling capability to develop user-defined Quasi-Dynamic Simulation models (QDSL models), where users are given access to the model calculation algorithm through the application of user-defined equations during Load Flow and Quasi Dynamic simulation. Within this training, different representative examples will be explained and developed, with which the user will be able to derive user-defined control strategies and electric vehicle charging procedures.

Course Content:

- Handling of user-defined models for Quasi-Dynamic simulation.
- Modelling an active power P(V) controller.
- Modelling a user defined transformer tap changer controller.
- Using a state variable to model electric vehicle charging.

Target audience: Power system engineers dealing with controller modelling for static simulation.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1, and with DPL programming in *PowerFactory*.

Duration:  1.5 days

Available in:  EN ;  DE

Generation Adequacy

Objectives: The participants work on the concept of capacity credit and how to calculate and analyse it in PowerFactory, with a special focus on renewable generation. Additional concepts such as the capacity factor, reserve capacity, loss of load expectancy (LOLE) and loss of load probability (LOLP) are discussed following a theoretical-practical approach. The impact of different factors on the capacity credit of a new power plant is analysed, such as the location and size of the renewable generation power plants, the effect of limited transmission capability, the analysis at peak load hours and the correlation between load and renewable generation.


Course Content:

- Main concepts of generation adequacy.
- Factors influencing the capacity credit calculation.
- Capacity credit of wind generation.
- Wind generation planning using capacity credit calculation.

Target audience: Power system engineers dealing with the integration of renewable generation.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1, but no prior knowledge of generation adequacy is required.

Duration:  1 day

Available in:  EN

Introduction to CIM

Objectives: A simple introduction to the Common Information Model (CIM) and the implementation within PowerFactory to enable network models to be exchange according to the ENTSO-E CGMES standard.

Course Content:

- Introduction to the basic concepts of CIM.
- Creation and export of a CIM archive.
- Import of a CIM archive and conversion to a PowerFactory grid network.

Target audience: Engineers wanting to understand the basic concepts of CIM.

Prerequisites: Participants should be familiar with the basic handling of *PowerFactory*, either from experience or by completing the Basic Training Part 1, but no prior knowledge of CIM is required.

Duration:  1-2 hours

Available in:  EN

Course Details - *StationWare*

Working with *StationWare*

Objectives: This course provides a compact and efficient introduction into *StationWare* and enables the participants to work with this system.


Course Content:

- Introduction to *StationWare* : Fundamental concepts, functionality and handling.
- Creation of the hierarchical structure of a network: The process of building locations, devices and settings.
- Management of business processes: Creation of processes and tasks.
- Data repository: Management of documents and software in the library, working with document attachments and links.
- Reports: Using built-in reports and user-definable Python reports and scripts.
- Interface with relay configuration software: Import/Export of different manufacturer specific settings files.
- Interface with *PowerFactory* : Exchange calculation relevant settings with *PowerFactory*.

Target audience: The course is intended for any *StationWare* users new to the *StationWare* software.

Prerequisites: No previous experience with *StationWare* is required.

Duration:  1 day

Available in:  EN

StationWare Administration

Objectives: This course enables the participants to set up, configure and maintain the *StationWare* system.

Course Content:

- Device model management: Device categories and types, settings lifecycle and lifecycle rights.
- Locations management: Location categories, types and rights.
- Processes and tasks: Process categories, types and process lifecycles and rights.
- Users, user groups and rights.
- Library folders and rights.
- Additional attributes: Definition and assignment of additional attributes.
- Administrative data maintenance.
- Table views.
- Python reports/scripts.
- Device and task modelling.

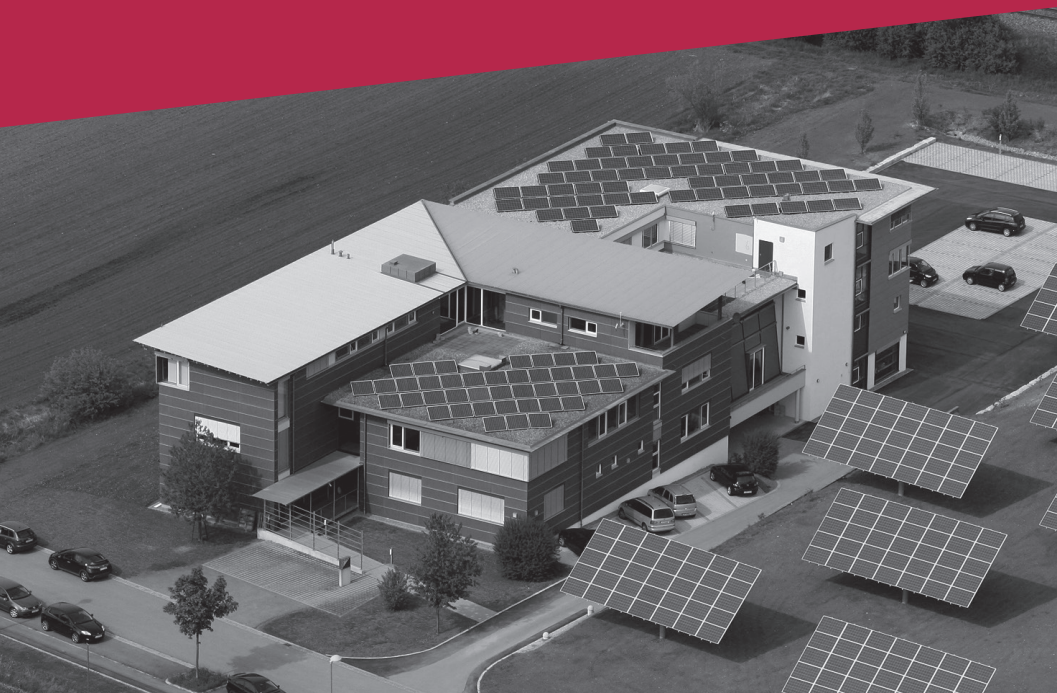
Target audience: The course is intended for *StationWare* administrators, who are responsible for the setup, configuration and maintenance of the system.

Prerequisites: Participants should already have knowledge about the basic handling of *StationWare* .

Duration:  2 days

Available in:  EN

DIGSILENT Company Profile



DIGSILENT is a consulting and software company providing engineering services in the field of electrical power systems for transmission, distribution, generation and industrial plants.

DIGSILENT was founded in 1985 and is a fully independent and privately owned company located in Gomaringen/Tübingen, Germany. DIGSILENT continued expansion by establishing offices in Australia, South Africa, Italy, Chile, Spain, France and the USA, thereby facilitating improved service following the worldwide increase in usage of its software products and services. DIGSILENT has established a strong partner network in many countries such as Mexico, Malaysia, UK, Switzerland, Colombia, Brazil, Peru, China and India. DIGSILENT services and software installations have been conducted in more than 140 countries.

DIGSILENT PowerFactory

DIGSILENT develops the leading integrated

power system analysis software PowerFactory, which covers the full range of functionality from standard features to highly sophisticated and advanced applications including wind power, distributed generation, real-time simulation and performance monitoring for system testing and supervision. For wind power applications, PowerFactory has become the power industry's de-facto standard tool, due to PowerFactory models and algorithms providing unrivalled accuracy and performance.

DIGSILENT StationWare is a reliable central protection settings database and asset management system, based on .NET technology. StationWare stores and records all settings in a central database, allows modelling of relevant workflow sequences, provides quick access to relay manuals, interfaces with manufacturer-specific relay settings and integrates with PowerFactory, allowing powerful and easy-to-use settings coordination studies.

PowerFactory Monitor (PFM) is a multi-functional Dynamic System Monitor which fully integrates with DIGSILENT PowerFactory software. PFM features grid and plant monitoring, fault recording, power quality, grid characteristics analysis and grid code compliance verification. It provides easy access to recorded data and test results and allows for the analysis of trends and the verification of system upset responses. PFM supports the latest standards and protocols.

DIGSILENT Consulting

DIGSILENT GmbH is staffed with experts of various disciplines relevant for performing consulting services, research activities, user training, educational programs and software development. Highly specialised expertise is available in many fields of electrical engineering applicable to liberalised power markets and to the latest developments in power generation technologies such as wind power and distributed generation. DIGSILENT has provided expert consulting services to several prominent PV and wind grid integration studies.



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DIGSILENT GmbH is certified to the ISO 9001:2015 standard. More information is available at www.tuv-sud.com/ms-cert