

Training Content

Power Transmission with LCC HVDC

DAY 1

MODULE 1: LCC HVDC – Fundamentals and steady state operation

Line commutated converters - Overview and principle of operation 1 1/2 h

Basics of power electronics and line-commutated converters (LCCs).

LCC operation principles. LCC technologies for HVDC.

Coffee break

Exercises: Analysis of six-pulse thyristor bridge using *PowerFactory* 1 1/2 h

Introduction to the thyristor-based rectifier model, effect of thyristor gate controls
load flow analysis.

Q&A session

Lunch break

Steady-state analysis of LCC HVDC 1 1/2 h

HVDC configurations and components.

Steady-state behaviour, ideal and real commutation, selection of commutation reactance.

Reactive power demand and compensation.

LCC HVDC harmonics and harmonic cancellation.

Coffee break

Exercise: Steady-state model of LCC HVDC in *PowerFactory* 1 1/2 h

Implementation of an LCC HVDC model, power flow setpoints, load flow analysis, reactive power compensation, functions for power flow optimisation in a transmission network.

Q&A session

DAY 2

MODULE 2: LCC HVDC – Dynamic Simulation

DC-Link Controls and Dynamics

1 1/2 h

Control schemes for rectifiers and inverters. Implementation in *PowerFactory*, firing angle and extinction angle control.

Coffee break

Exercise: Power System Analysis

1 1/2 h

DC link power control and re-dispatch, response to AC-system faults.

Q&A session

Lunch break

LCC HVDC - Interactions with AC Systems

1 1/2 h

AC System Strength, Steady-state stability, Dynamic Stability, Screening and Analysis methods for Sub-Synchronous Oscillations (SSO).

Coffee break

Exercise: Interactions with AC Systems

1 1/2 h

Evaluation of system strength, analysis of Sub-Synchronous Oscillations (SSO).

Q&A session

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



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