An Introduction to RTDS® Real-Time Simulation

The National HVDC Centre

Training Course Overview

1   About the Course

This course introduces you the RTDS® hardware and RSCAD software. The aim is to enable you to perform real-time network simulation studies using RSCAD and RTDS®.

This course comprises a 3 full-days of training from 9:30 am on Tuesday 22nd January to 3:30 pm on Thursday 24th January 2019.

Cost is kept to a minimum, at £90 (or Euro 100) per participant for the whole course (incl lunches each day).

2   Learning Outcomes

By the end of the course delegates will have:

- o   A clear understanding of setting-up and configuring RTDS® hardware;
- o   Understanding of the capabilities of the simulator; and
- o   Knowledge of RSCAD Software with the ability to run real-time simulations and understand their outputs.

3   Summary of Course Contents

The course will cover:

- o   Overview of the principles of the RTDS® Simulator and an introduction to the electromagnetic transients algorithm used;
- o   Introduction to the RSCAD software suite and its modules;
- o   Building and running a number of power system simulation cases demonstrating the capabilities (and limitations) of the RTDS® Simulator;
- o   Use of various I/O cards – GTAO, GTAI, GTDO, GTDI and GTFPI;
- o   Introduction to developing an interface between external HVDC replica controls and the RTDS® Simulator for closed-loop testing;
- o   Overview of RSCAD's CBuilder module; and
- o   Overview of using scripts to automate running simulation cases.

4   Benefits

In this course delegates will benefit from gaining skills and experience performing real-time network simulation studies using RSCAD and RTDS®; directly from Simulation Engineers who have run such studies to support the commissioning of an HVDC scheme using Replica control hardware.

5   Expectations

- o   Delegates will be expected to have a basic knowledge of off-line network simulation with some experience using off-line simulation tools (such as PSCAD or MATLAB); and
- o   During the course, delegates will be expected to contribute and actively participate in all aspects of learning.

6   Description of Daily Course Content

Day 1	Day 2	Day 3
Welcome & Introduction (9:30am) o Safety briefing; o Participants' introductions, and learning expectations; o Overview of the HVDC Centre; o Outline plan for day.	**Welcome & Daily Plan** (9:00 am) o Recap from previous day; o Outline plan for day.	**Welcome & Daily Plan** (9:00 am) o Recap from previous day; o Outline plan for day.
1) Introduction to Real-time simulation o What is real-time simulation and when is it used (with reference to Cigre brochure 563).	**1) Introduction to I/O** o How to use different I/O options.	**1) Tutorial 6: I/O with Small Time-Step** o How to use different I/O options with Small Time-step.
2) Introduction to RTDS® Hardware o RTDS® Hardware components description and uses.	**2) Introduction to Small Time-Step** o Overview of small time-step simulation.	**2) Use of MMC Support Unit** o Overview of MMC Support unit function.
3) Configuration o Steps to prepare and run new simulation cases.	**3) Tutorial 3: Simple Voltage Rectifier** o Basic steps to prepare and run new simulation case using small time step.	**3) Use of Multi-terminal CMS Replicas** o Overview Replica applications; o Introduction to RTDS model. o Trial of operation of CMS using Replicas.
4) Tutorial 1: Voltage Divider o How to build a voltage divider.	**4) Tutorial 4: Simple STATCOM Example** o Basic steps to prepare and run new simulation case using small time step.	**4) Overview of CBuilder and Scripts** o Overview of RSCAD's CBuilder module; o Overview of using scripts to automate running simulation cases.
5) Tutorial 2: Simple AC Power System o SLD drawing; o Use of T-Line; o Introduction to Faults; o Analogue output	**5) Tutorial 5: Interfacing Time Steps** o How to integrate a small and large time step simulations.	**5) Practice and demonstrations on RTDS®** o Supported practice using RSCAD and RTDS®.
Review & Wrap-up (4:30pm) o Review achievement against learning objectives; o Agree follow-up actions; and o Daily Feedback.	**Review & Wrap-up** (4:30pm) o Review achievement against learning objectives; o Agree follow-up actions; and o Daily Feedback.	**Review & Wrap-up** (3:30pm) o Review achievement against learning objectives; o Agree follow-up actions; and o Course Feedback.

Please contact info@hvdccentre.com for more information or to register for the course.