

Course Overview

1 About the Course

This course introduces 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 three days of training.

2 Learning Outcomes

By the end of the course delegates will have:

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

3 Summary of Content

The course will cover:

- Overview of the principles of the RTDS® and an introduction to electromagnetic transient simulation
- Introduction to the RSCAD® software suite and its modules
- Building and running several power system simulation cases demonstrating the capabilities (and limitations) of the RTDS®
- Use of various input/output cards – GTA0, GTAI, GTDO, GTDI and GTFPI
- Introduction to developing an interface between external hardware and the RTDS® for closed-loop testing, including protection relays and HVDC replica controls
- Introduction to sub step modelling

4 Benefits

Attendees 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 with HVDC scheme replica control hardware and other applications.

5 Expectations

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

6 Course Content

Day 1 9.30am - 4.30pm	Day 2 9.30am - 4.30pm	Day 3 9.30am - 3.30pm
<p>Welcome and Introduction</p> <ul style="list-style-type: none"> Participant introductions and learning expectations Overview of the HVDC Centre Plan for the day 	<p>Welcome and Daily Plan</p> <ul style="list-style-type: none"> Recap from previous day Plan for the day 	<p>Welcome and Daily Plan</p> <ul style="list-style-type: none"> Recap from previous day Plan for the day
<p>1) Introduction to real-time simulation</p> <ul style="list-style-type: none"> EMT algorithm Applications Reference CIGRE brochures 	<p>1) I/O options</p> <ul style="list-style-type: none"> How to configure and use different I/O options 	<p>1) Simulations with different time steps</p> <ul style="list-style-type: none"> RSCAD® Substep and Superstep How to integrate small and large time step components
<p>2) Introduction to RTDS® Hardware</p> <ul style="list-style-type: none"> NovaCor (and PB5) I/O cards Connections and interfacing 	<p>2) More on RSCAD Software</p> <ul style="list-style-type: none"> Utilities Hints and tips Things to look out for 	<p>2) Interfacing with replicas</p> <ul style="list-style-type: none"> Overview of MMC support units Introduction to CMS models Demo operation of CMS
<p>3) Introduction to RSCAD® Software</p> <ul style="list-style-type: none"> Installation Configuration with RTDS® Modules 	<p>3) Introduction to scripting</p> <ul style="list-style-type: none"> Overview of using scripts to automate running simulation cases 	<p>3) Recent Project Demonstrations</p> <ul style="list-style-type: none"> Examples of RTDS® use in recent projects at the HVDC Centre
<p>4) Tutorial 1: Voltage Divider</p> <ul style="list-style-type: none"> Basic simulation case introducing RSCAD® and RTDS® 	<p>4) Example: Hardware-in-Loop demonstration</p> <ul style="list-style-type: none"> Basic steps to prepare and run a HiL simulation Amplifiers Relay testing 	<p>4) Discussion on new tools, methods and research for real-time simulation</p> <ul style="list-style-type: none"> Software-in-loop, GTSOC Co-simulation across platforms
<p>5) Tutorial 2: Simple AC Power System</p> <ul style="list-style-type: none"> Use of T-Line module Introducing faults Analogue output 	<p>5) Time Synchronisation</p> <ul style="list-style-type: none"> Use of GTSYNC card and GPS (or other) time source 	<p>5) Supported Practice</p> <ul style="list-style-type: none"> Further work with tutorials and examples
<p>6) RTDS Support</p> <ul style="list-style-type: none"> Manuals, tutorials and examples Introduction to online support 	<p>6) RTDS Support</p> <ul style="list-style-type: none"> Call with online support 	<p>6) RTDS Support</p> <ul style="list-style-type: none"> Call with online support
<p>Review & Wrap-up</p> <ul style="list-style-type: none"> Review learning Look ahead to tomorrow Daily feedback 	<p>Review & Wrap-up</p> <ul style="list-style-type: none"> Review learning Look ahead to tomorrow Daily feedback 	<p>Review & Wrap-up</p> <ul style="list-style-type: none"> Review learning Course feedback