



RTDS Simulator Advanced Applications Training Course

Power Electronics, HVDC, FACTS & Renewable Energy

RTDS Technologies Inc

150 Innovation Dr. | Winnipeg, MB

www.RTDS.com

Facilitated by: Sumek Elimban

Dates: March 20-24, 2023

Start time: 9:00 am

End time: 4:00 pm

Course Summary

The course covers the different simulation environments for power electronics modelling and applications such as HVDC, FACTS, and renewables energy system will be discussed and explained.

Course Topics

The following topics will be covered as part of this course:

- Substep simulation environment and theory*
- Modeling VSC converters*
- Renewable Energy applications*
- Modular Multilevel Converters modelling*
- Hardware in the loop for VSC applications*
- Power hardware in the loop of PV inverter*
- GTSOC- Integration of black box controller in real time*
- GPES – General Power Electronic Solver*

Course Schedule

This course starts at 9:00 AM CDT each day—please arrive prepared by this time. The goal is to finish each day by 4:00 PM CDT (due to questions and discussions, this may go longer.)

Below is an approximate schedule for the RTDS Simulator Advanced Training Course. **Please note, times are approximate and subject to change**

Day 1:	
Substep Modelling Theory <ul style="list-style-type: none"> • Introductions followed by confirming installation of the latest version of RSCAD onto participant’s laptops. • Explanation of the RSCAD Substep theory for modeling power electronic circuits. • A boost converter example to introduce Substep environment. 	9:00 AM – 12:00 PM
Lunch	12:00 – 1:00 PM

Day 1 continued:	
<ul style="list-style-type: none"> Hands on tutorial where the participants will assembly an inverter test system. This case will provide training on developing PWM firing signals, Mainstep/Substep interface and configuring substep components. 	1:00 – 4:00 PM

Day 2:	
Universal Converters Models, Average vs Switched converter models <ul style="list-style-type: none"> The concept and theory behind UCM switched and average converter models will be introduced. A hands on tutorial will be provided comparing the two UCM modes. DQ control theory <ul style="list-style-type: none"> Explanation of DQ decouple control theory 	9:00 AM – 12:00 PM
Lunch	12:00 – 1:00 PM
Renewable Energy System modelling <ul style="list-style-type: none"> PV Wind Battery 	1:00 – 4:00 PM

Day 3:	
Renewable Energy System modelling continued... Interfacing to external equipment to NovaCor (PE applications) <ul style="list-style-type: none"> A HIL example using a TI lauchpad to model a PWM controller 	9:00 AM – 12:00 PM
Lunch	12:00 – 1:00 PM
<ul style="list-style-type: none"> Interfacing to ESS controller Power hardware in the loop application. Integrating PV inverter to NovaCor with a 4-quadrant amplifier. 	1:00 – 4:00 PM

Day 4:	
Modular Multi-level Converters <ul style="list-style-type: none"> • Details regarding the theory for modeling MMC converter valves in real-time are discussed. The different available MMC models will be introduced including both simplified and detailed equivalent valve models. • The GTFPGA unit will be introduced. The GTFPGA unit models a detailed equivalent valve model on a FPGA and is interfaced to the RTDS Simulator. 	9:00 AM – 12:00 PM
Lunch	12:00 – 1:00 PM
Training Topic <ul style="list-style-type: none"> • MMC continued ... • The use of MMC valve models in simulating large DC grids on a real-time platform is demonstrated. 	1:00 – 4:00 PM

Day 5:	
GTSOC <ul style="list-style-type: none"> • Hardware platform for integrating blackbox vendor controls for real time software in the loop. • Procedure explained and demonstration GPES <ul style="list-style-type: none"> • General power electronic solver to model PE circuits with time steps as low as 500 nanoseconds. Main application is for modelling custom converter topologies. Capabilities and limitation will be explained. 	9:00 AM – 12:00 PM
Lunch	12:00 – 1:00 PM
GPES continued... LCC HVDC (time permitting) <ul style="list-style-type: none"> • Demonstrate the capabilities of the RTDS simulator for LCC HVDC applications Training Wrap Up	1:00 – 4:00 PM

Course Expectations

Please arrive prepared for this training course at 9 AM CDT each day. Laptops or computers will not be provided—please bring your own or arrange to have one available for the training dates. Ethernet connection will be required. If your laptop does not have an ethernet connection available, please bring an adaptor. Please ensure RSCAD FX is installed on every computer in advance.

Contact Us

If you have any questions about any of the topics discussed during this training course, don't hesitate to contact us via email or via one another contact method listed below.

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