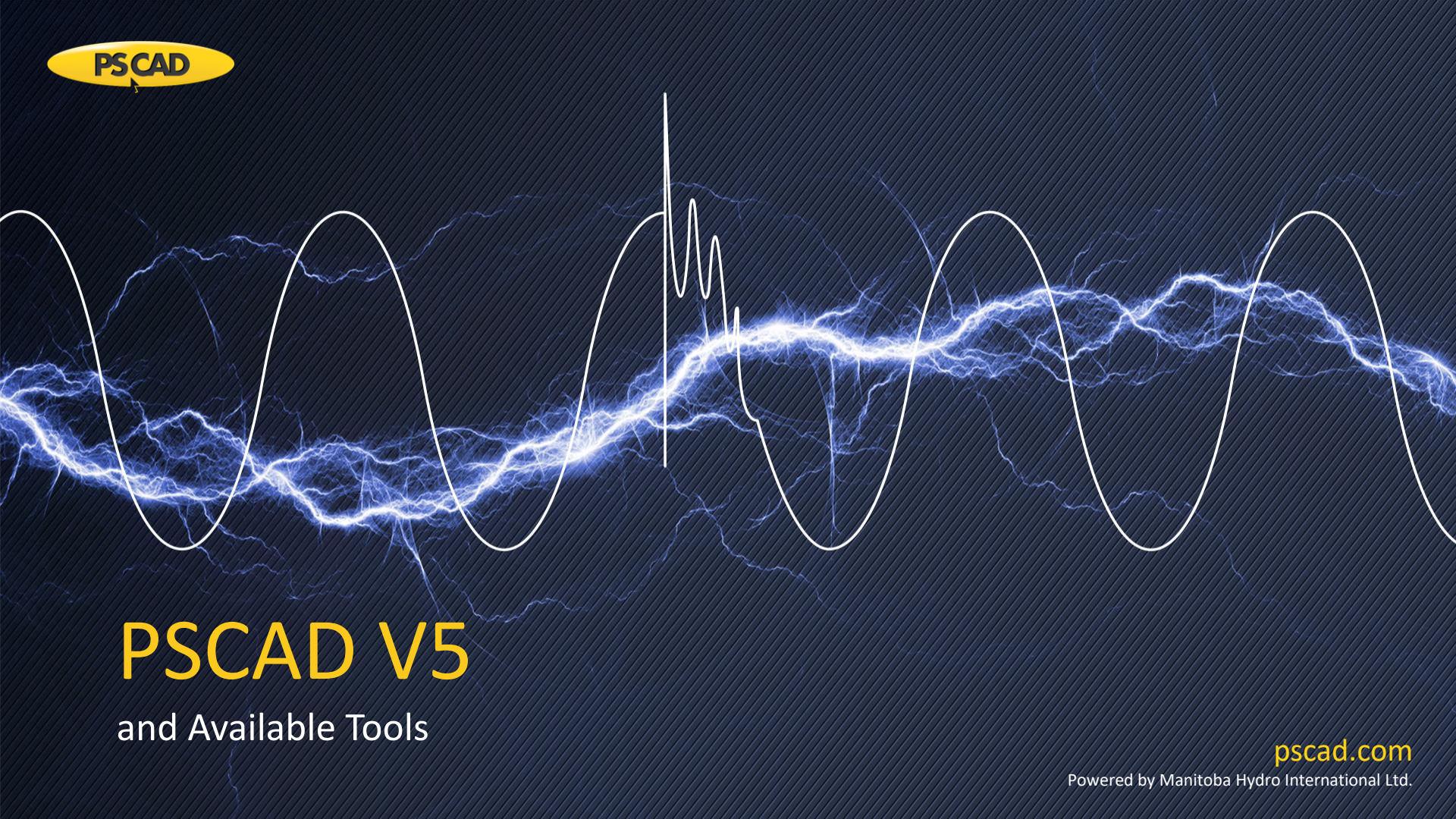


PSCAD V5

and Available Tools

pscad.com

Powered by Manitoba Hydro International Ltd.

PSCAD™

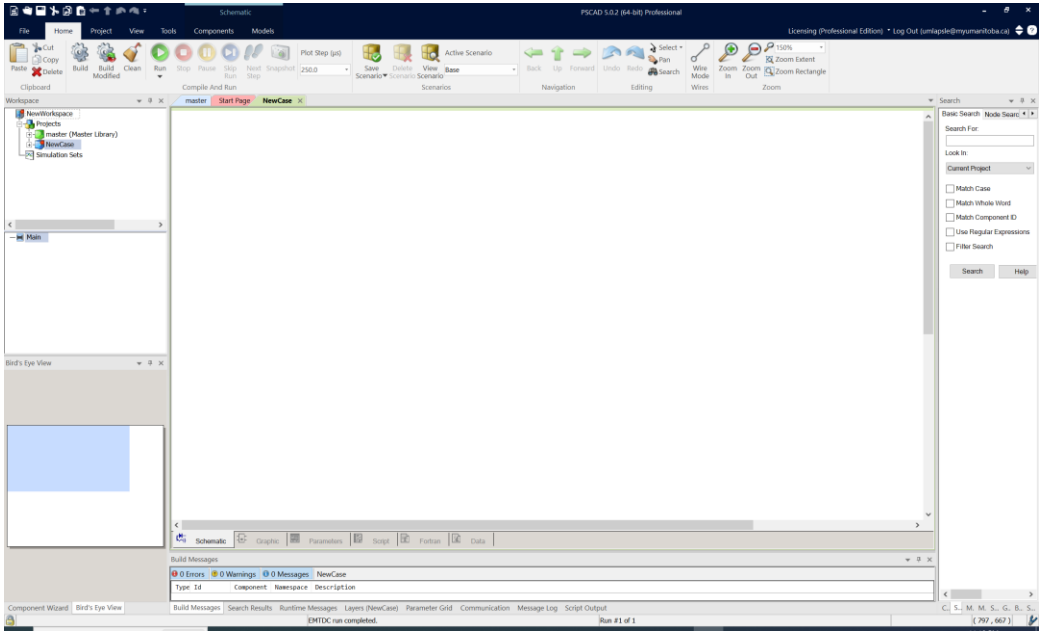
- The world's most advanced power systems EMT simulation software.
  - Fast & Precise
  - User friendly
- Over 40 years of experience.
- 46,000+ licenses in over 100 countries.
  - Utilities, manufacturers, consultants, academia, and more
- Support team of 20+ highly skilled and specialized engineers and developers.

PSCAD™

- **P**ower **S**ystems **C**omputer **A**ided **D**esign
- User interface for the EMTDC™ simulation engine
- Originally used to gain understanding of very specific and technical areas
- The penetration of renewables led to more complex controllers
- EMT became a necessity to study large electric grids
    - Sub-synchronous Resonance SSR (including frequency scanning)
    - Investigation of novel technologies (i.e. grid forming inverters)
    - Dynamic wide area studies

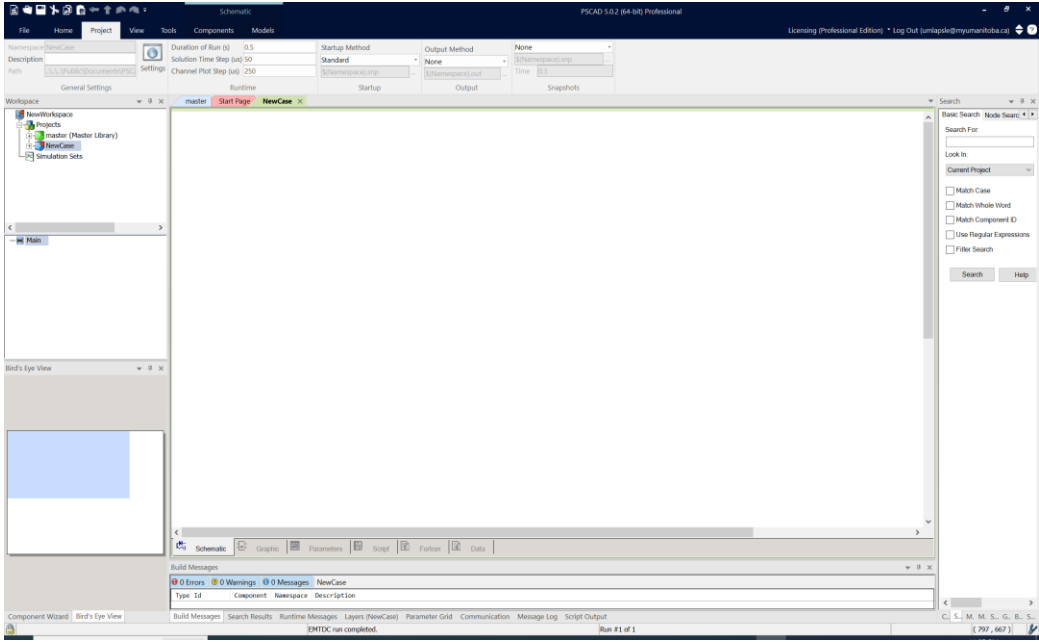
PSCAD™

- Home tab: Start/Stop simulation



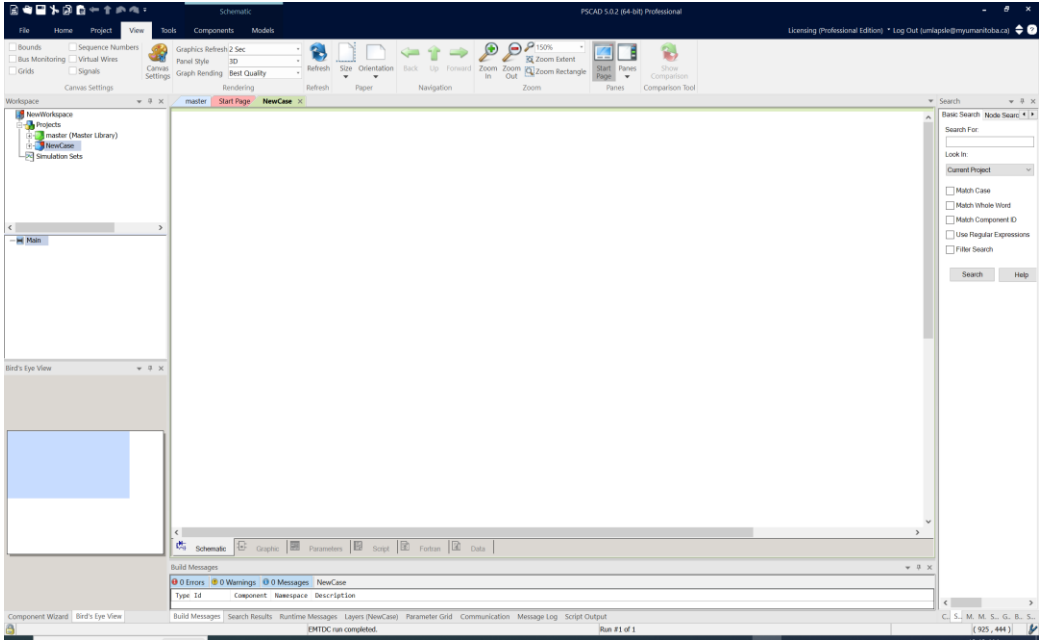
PSCAD™

- Home tab: Start/Stop simulation
- Project tab: Simulation settings



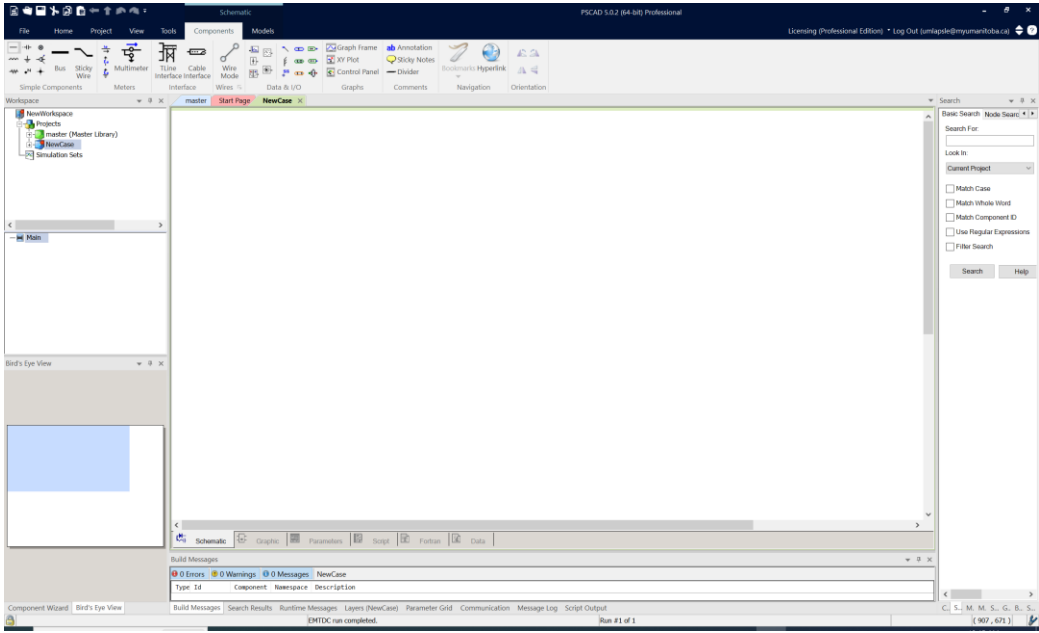
PSCAD™

- Home tab: Start/Stop simulation
- Project tab: Simulation settings
- View tab: Canvas and pane settings



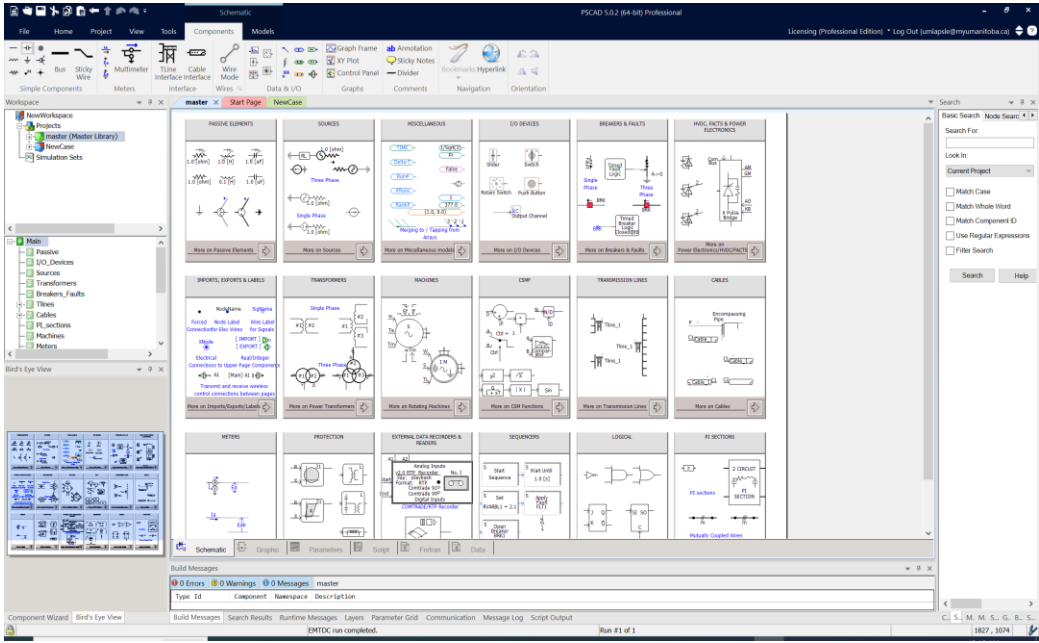
PSCAD™

- Home tab: Start/Stop simulation
- Project tab: Simulation settings
- View tab: Canvas and pane settings
- Components tab: Frequently used components



PSCAD™

- Home tab: Start/Stop simulation
- Project tab: Simulation settings
- View tab: Canvas and pane settings
- Components tab: Frequently used components
- Master library: Collection of components

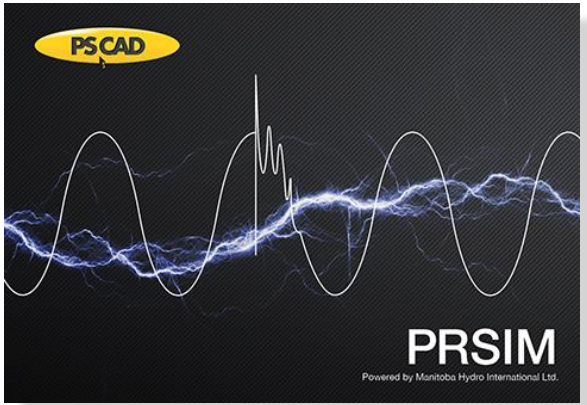


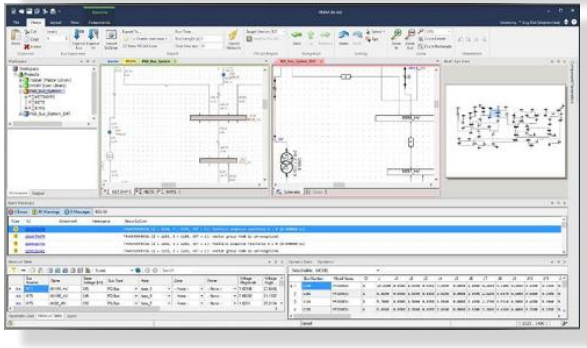
PRSIM™

Power System Importer

PRSIM: Convert standard PSS/e or PowerFactory network data to PSCAD

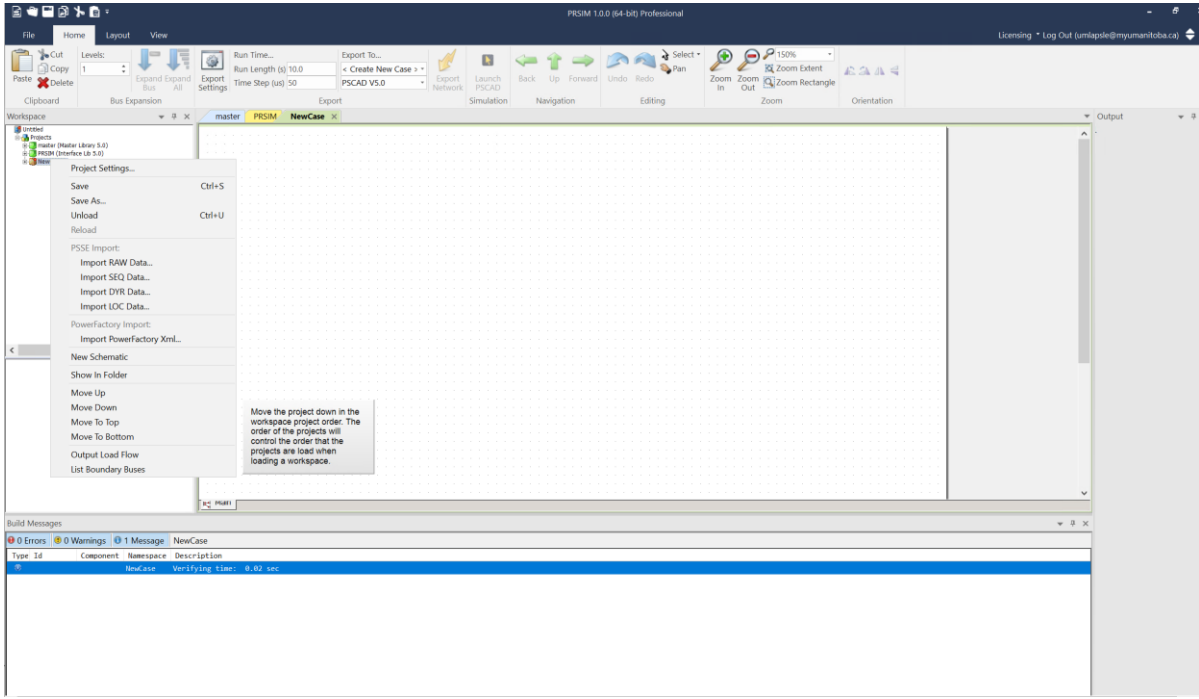
- Import detailed dynamic, sequence, location data for automatic schematic expansion
- Form network equivalents for unexpanded segments of the network
- Re-initialize previously generated PSCAD projects





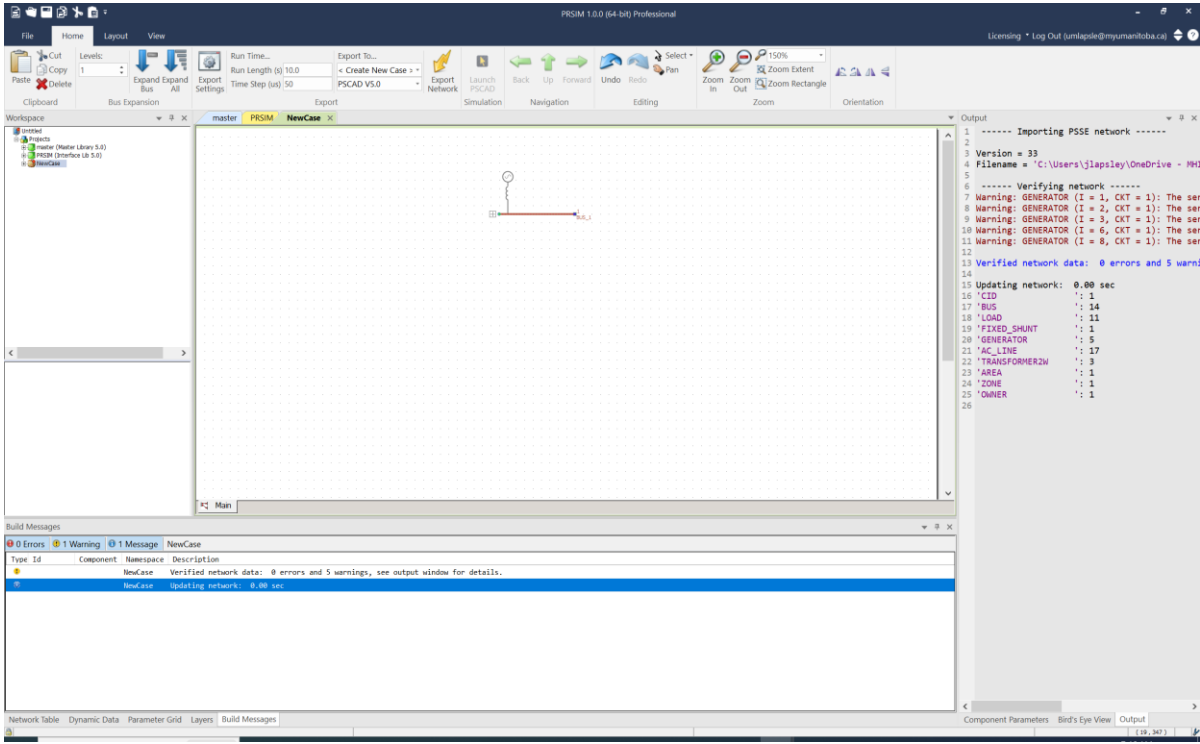
PRSIM™

- Import system data



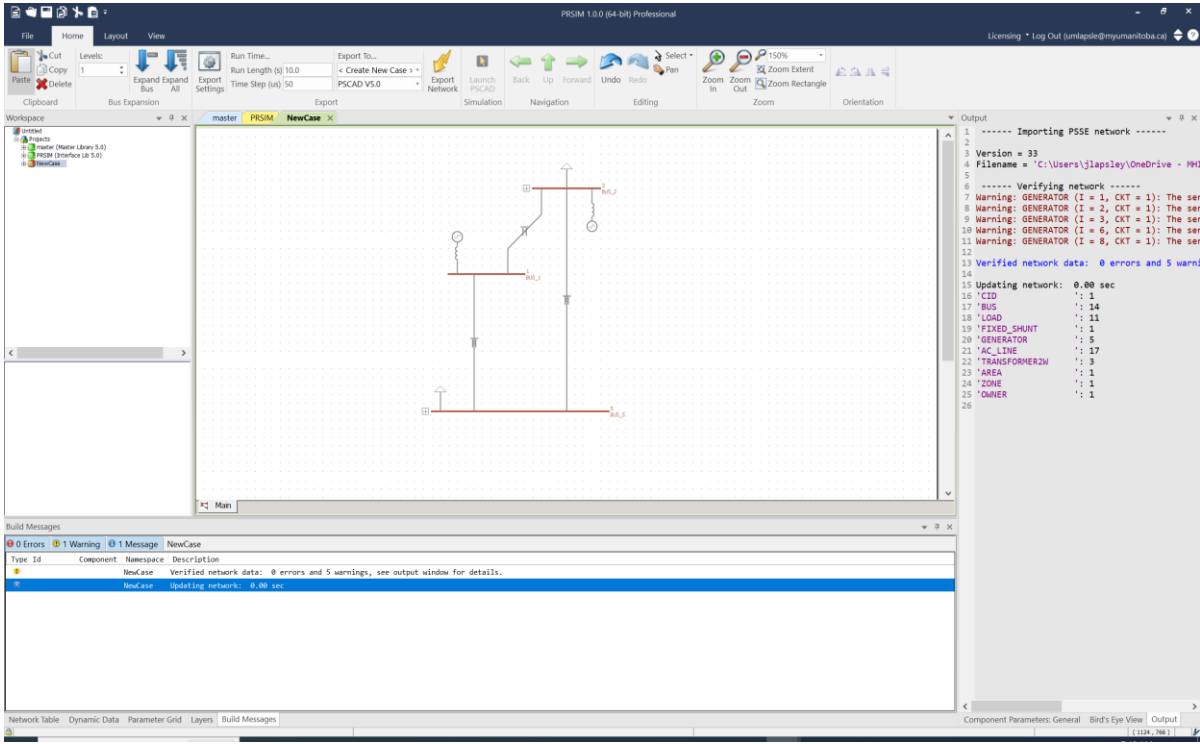
PRSIM™

- Import system data
- Use location data to create the network or add a bus



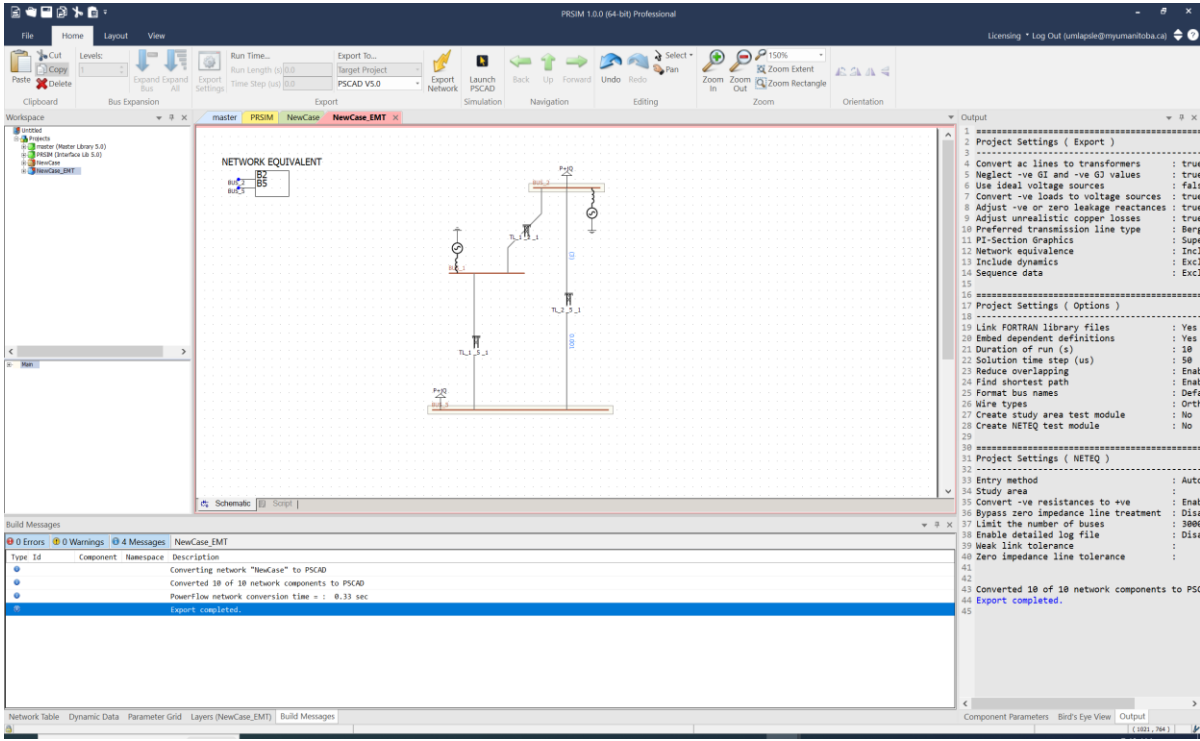
PRSIM™

- Import system data
- Use location data to create the network or add a bus
- Click on the plus sign to expand the bus



PRSIM™

- Import system data
- Use location data to create the network or add a bus
- Click on the plus sign to expand the bus
- Export and PRSIM will calculate the network equivalents at the boundary buses

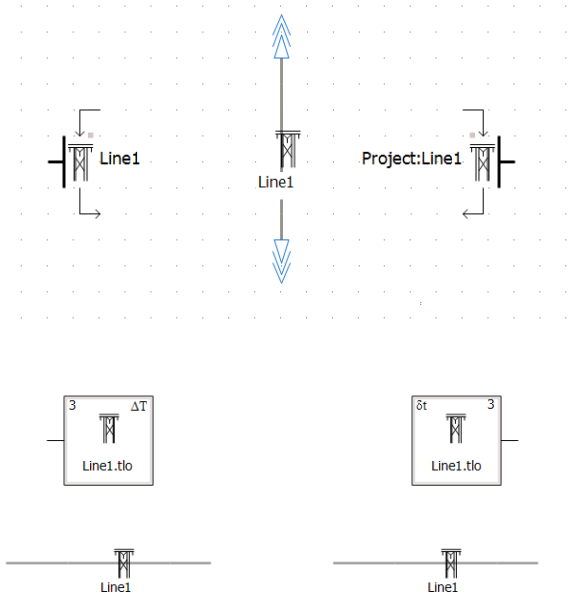


Large Networks

Parallel Processing

Distribute large and computationally intensive networks onto multiple CPU cores.

- ENI – Same simulation timestep for all segments
- Multi-rate – Different simulation timesteps as required



Large Networks

System Studies

Desired network modelled with all dynamic devices integrated:

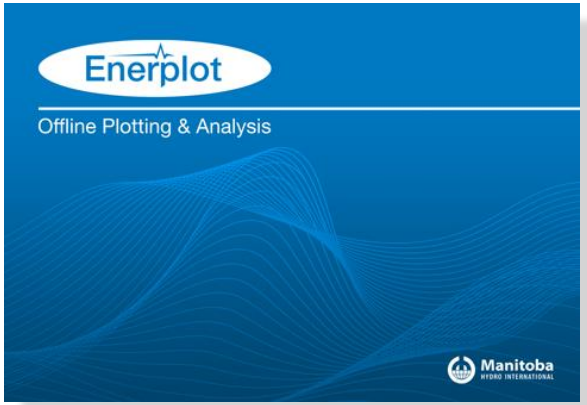
- Dynamic fault analysis (LVRT, HVRT, etc)
- Sub-synchronous Resonance (SSR) and Control Interaction (SSCI) studies
- Aid in the commissioning of new plants; wind, solar,, etc
- Investigation of novel technology. E.g. Grid forming inverters BESS, Solar, Offshore wind farm
- More studies: TOV, auto-reclose, protection, harmonic analysis, transient stability, power quality, etc….

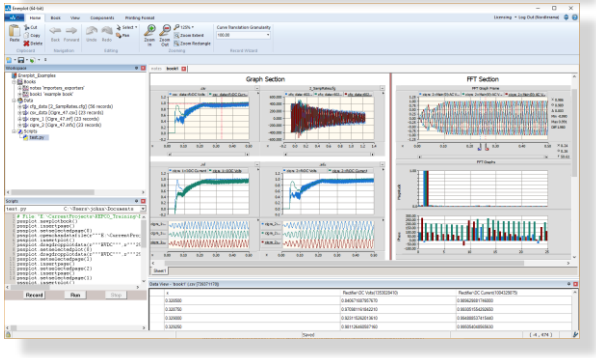
ENERPLOT™

Process Data Quickly and Efficiently

Fully automatable plotting and data processing application

- Automated scripting with embedded Python interface.
- Embedded math parser for creating and modifying new and pre-existing curves. FFT, etc
- Template projects for fast repeatability.
- Loading large data files with the lazy-loading feature.
- **Application Help**: Fully documented.





Notable PSCAD™ Features: Black-boxing

- Proprietary models developed by third parties can be black-boxed completely in PSCAD
- Black-box controls (and their respective algorithms) as well as electrical models, in the process, hiding all sensitive information
- Multiple vendors, each owning their own IP, can work together securely with PSCAD

Notable PSCAD™ Features: Automation

- Integrated within PSCAD is a *Python Automation Library*
- This gives the user endless flexibility in how they want to run their PSCAD case and what to do with the resulting data
- Automation Library can be used to
  - Run many simulations
  - Change model topology
  - Export relevant data to a report
  - Automatically black-box open models
  - Send an email to give simulation status
  - And more…

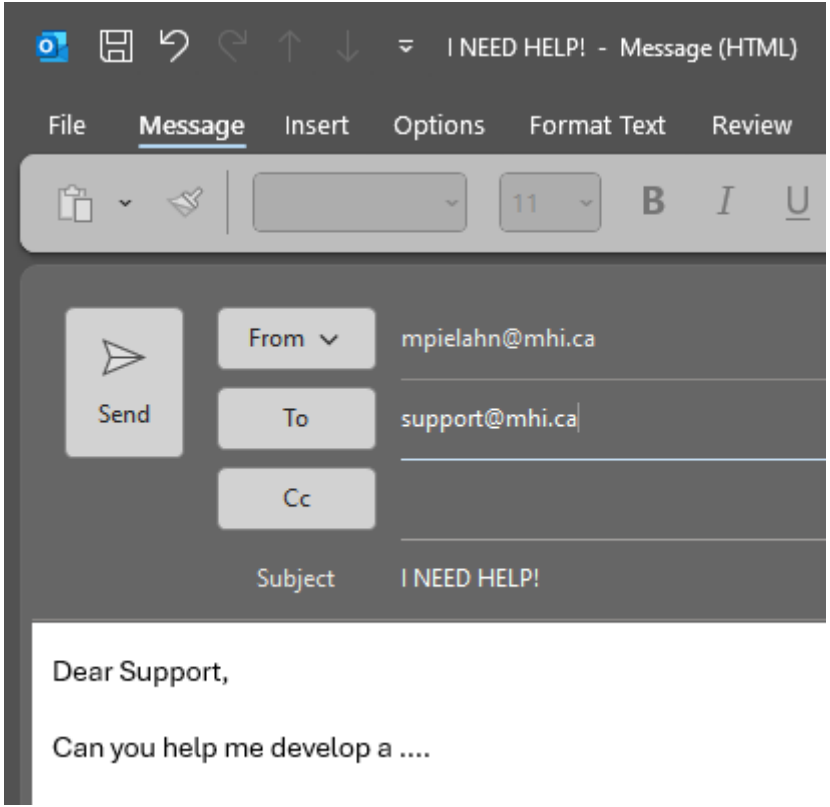
Notable PSCAD™ Features: Custom Components

- Can make custom components in as much detail as desired
- Integrate 3rd party models of any nature via custom components
- Complex controls are often developed in a C-based language and compiled as a DLL. The DLL can be safely integrated into PSCAD, keeping its contents confidential

MHI Support

- Support desk staffed by highly-qualified engineers and developers
- Available to any user, with priority given to those who are licensed with active maintenance
- We strive to ensure that your experience with our software is the best it can be. If you have a problem, we would be pleased to help you resolve it as quickly as possible
- support@mhi.ca

pscad.com/support/overview



Thank You

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