About Us

Manitoba Hydro International Ltd. (MHI) assists power utilities, governments, and private sector clients worldwide in the efficient, effective, and sustainable delivery of electricity. MHI has provided utility infrastructure management, consulting, and training services to over 60 countries worldwide. Utilizing the human resources of its parent company, Manitoba Hydro, MHI provides electric utility expertise in the planning, design, construction, and operations management of generation, transmission, and distribution facilities to its international clients. In response to current industry trends, MHI has also developed specialized expertise in the areas of utility infrastructure management services, change management, utility restructuring, and re-regulation advisory services.

MHI Capabilities

In addition to providing technical and management services for the Operation and Maintenance of Generation, Transmission and Distribution infrastructure, MHI provides other consulting and management services to clients worldwide; assisting them at every level of power system development, management, training and operations, and helping them in their future development on a sustainable and self-reliant basis. The services available fall into the following areas:

- Energy Sector Issues
  From organizational restructuring to deregulation, MHI has extensive experience in developing results-oriented solutions to today’s most prevalent Energy Sector Issues.

- Utility Management
  MHI has built an unprecedented reputation for efficient and effective Utility Management through its Canadian and North American experience combined with a series of overseas Management Services Contracts.

- Environment
  MHI’s environment professionals have developed a wealth of experience in the development and implementation of Environmental Management Systems, based on decades of work and study in various areas including emission control, site remediation, shoreline erosion, flood management and compensation, forest enhancement, and preservation of natural habitat.

- Finance and Administration
  MHI helps utilities make informed decisions by providing sound financial and economic data analysis. This information forms the basis for complex business models, economic analyses, and scenario planning, which enable organizations to make better choices about where to allocate their capital and operating funds.

- Generation, Transmission and Distribution
  MHI has an exceptional track record of proven results in providing world-class technical and operational services to develop, operate and maintain generation, transmission, and distribution infrastructure.

- Human Resource Management
  MHI has a wealth of experience in building organizational capacity through the design and delivery of utility-specific technical and management training programs. MHI delivers proven, world-class, Strategic Human Resource Management results to its clients around the world.

- Information and Communications Technology
  MHI has extensive experience in planning, implementation, and supervision of Information Technology projects. From requirements analysis and specification through to bid document preparation and evaluation and selection, MHI has assisted with third-party implementation procurement and supervision, and has also performed many independent MIS implementation projects, including technology transfer training and post-implementation support.
The Manitoba HVDC Research Centre provides a comprehensive array of engineering services including AC and HVDC planning and feasibility studies; equipment specifications; operations and commissioning consulting services, as well as, training and research services for power systems. Contrary to our name, the services we provide are for much more than just HVDC and include: load flow and fault analysis, detailed electro-magnetic transient studies and custom models (emt), transient stability studies, harmonic analysis, and risk/reliability analysis.

About Us
The Manitoba HVDC Research Centre has become a world leader in the technology of electric power system simulation, applied power systems analysis, and related technologies. The Centre develops and markets an array of products and services worldwide including the renowned power system simulation software PSCAD® (PSCAD®/EMTDC™) and real time playback system RTP™.

Our Team & Tools
The Manitoba HVDC Research Centre is fortunate to have a highly experienced team of multi-disciplined power systems and simulation specialists. Our unique teams’ intimate familiarity developing and using analytic power system tools including PSCAD proves to be an advantage in resolving the complex problems now facing power systems.

Our analysis tool kit includes a wide range of leading commercial software packages for power flow and stability studies. Though PSCAD is central to some of our work, we also have a number of additional specialized in-house software and hardware tools for harmonic analysis, reliability and risk analysis, corona and field effects, and real-time testing of protective and control devices.

More information about the tools we use and our experience is available upon request.

Laboratory & Testing Services
Laboratory services are available for power quality measurement, and transient testing for protective relays and HVDC controls. A real time playback system and power amplifiers are utilized to generate the testing waveforms. Any complex transient signals or harmonically distorted waveforms simulated in PSCAD can be easily and seamlessly used in the testing. As well, we have developed a 12kW, variable voltage and frequency supply to further enhance our laboratory testing capability.

Ability to Perform
Engineering Service Experience
The Centre has undertaken a variety of engineering service projects in the past. A detailed listing of past projects is available upon request.
Scope of Engineering Services

Our experience in power systems since 1981 has provided a wide range of engineering services capabilities, including power system studies, project management, power quality monitoring service and real time testing of devices. Find below a listing of the capabilities and experience:

The following list highlights our main areas of engineering service expertise:

- **AC transient studies (High voltage, medium voltage, distribution level)**
  - Breaker TRV compliance
  - Switching studies for equipment rations and surge arrester rating
  - Transformer and line energizing
  - Ferro-resonance and other complex resonance issues

- **Fast bus transfer studies**
  - Critical loads including critical motors loads at nuclear and other power plants

- **Power quality studies**
  - Detailed modeling of Arc Furnace installations and flicker analysis
  - FACTS based solutions for power quality issues (flicker, voltage dips, sags)
  - Motor starting and flicker due to cyclic loads
  - Harmonics and filter design (passive, active)

- **Black start studies**

- **HVDC interconnection studies**
  - Planning and feasibility
  - AC- HVDC system interaction modeling including fault performance
  - Control optimization
  - AC-DC mutual coupling effects

- **Modelling and assessment of FACTS based solutions for power system operation. (SVC, STATCOM, TCSC and other)**

- **Transmission line field effects and corona analysis**

- **Sub synchronous resonance investigation**
  - Series compensation of lines and related issues
  - Induction generator effects and torsional interactions

- **Insulation coordination and lighting studies**
  - Arrester ratings and BIL compliance

- **Detailed fault and protection system analysis**
  - Detailed analysis of mal-operation of protection
  - Detailed CT, CCVT, VT modeling to investigate complex saturation effects.
  - Relay testing with realistic transient fault waveforms using Real Time Playback
  - Auto reclosing issues

- **Capacitor bank design and switching studies at all voltage levels.**
  - Inrush/out rush reactor design
  - Impact on harmonic impedance profile of the network and filter requirements
  - Resonance issues

- **Wind farm integration studies**
  - Detailed modeling of wind turbines, generators and complex controls
  - Interconnection costing
  - Power and reactive power control
  - Fault performance and low voltage ride through
  - Wind turbine review for interconnection requirements compliance

- **Industrial system application**
  - Machine drive analysis for system impacts
  - Active filtering
  - Oil and mining industry applications

- **Simulation and custom model development**
  - Development of advanced power system and associated control systems for electromagnetic transient simulation studies. Models including custom machines, transformers, non-linear loads, power electronics and FACTS devices
  - Development of detailed custom modules

- **Training for PSCAD and Advanced General Power Systems Topics**
  - Training on the PSCAD/EMTDC tool, and hands-on workshop on its application in power system studies, such as transient study, power quality, distributed generation, wind farms, HVDC, FACTS, etc.
  - General advanced power system training including HVDC, FACTS/SVC, etc.

www.hvdc.ca
Company Profile

Electric utilities all over the world are faced with the same challenge of optimizing their transmission line resources to maximize capacity and satisfy the ever-growing demand for power. Prior to taking on such challenging upgrade projects, utilities require up-to-date information on their transmission line infrastructure. WIRE Services uses the latest in LiDAR technology to capture survey data and provide clients with an accurate “as-built” model of their line. This model provides the basis upon which detailed engineering analysis can be performed to provide optimized solutions.

Worldwide Integrated Rating Enhancement (W.I.R.E.) Services, a combined business initiative between Manitoba Hydro, Canada’s 4th largest electric utility and Calgary-based LiDAR Services International (LSI), a company with many years of experience in airborne LiDAR surveys. W.I.R.E. Services was the first and only utility-based company to combine LiDAR surveys with utility applications and provide 3rd party electric utilities with a “full service” solution package for their transmission line needs. Its knowledge and experience in using LiDAR technology, coupled with extensive utility experience in transmission line design enables W.I.R.E. Services to provide meaningful information on utility transmission lines.

Through its professional and highly experienced employees, W.I.R.E. Services is a “one-stop shop” for airborne LiDAR data collection, thermal rating analysis, re-rating services, new route surveys, environmental applications and danger tree / vegetation assessments.

Since 2001, W.I.R.E. Services has flown tens of thousands of kilometers of transmission line and line routes for clients in Canada the US and Central America.

List of Services

- **Airborne LiDAR Data**
  - LiDAR Scanning Laser Technology
  - 3-D “As-Built” Survey Model
  - Ortho Rectified Digital Imagery
  - Forward Digital Video / Tower Stills

- **Thermal Rating Analysis**
  - Ground Clearance, Sag & Tension
  - Maximum Thermal Limits
  - PLS-CADD™, TLPRO™
  - Qualified Industry Experience

- **Vegetation Management**
  - Clearance Analysis
  - NERC Compliant Assessment
  - Danger Tree / Falling Distance
  - Growth Rate Modeling

- **Re-Rating Service**
  - Innovative Cost Effective Solutions
  - Construction Ready P&P Drawings
  - XECONEX™ Implosive Splices
  - Upgrade Solutions

- **Route Surveys**
  - Wide Area Land Mapping
  - Transmission Line Route Surveys
  - Reservoir / Forebay Elevation Survey
  - Land / River Shoreline Mapping

- **New T/L Engineering**
  - Transmission Line Design Engineering
  - Tower Optimization
  - Conductor Selection Studies
  - PLS-CADD Line Modeling