

GRID MODERNIZATION

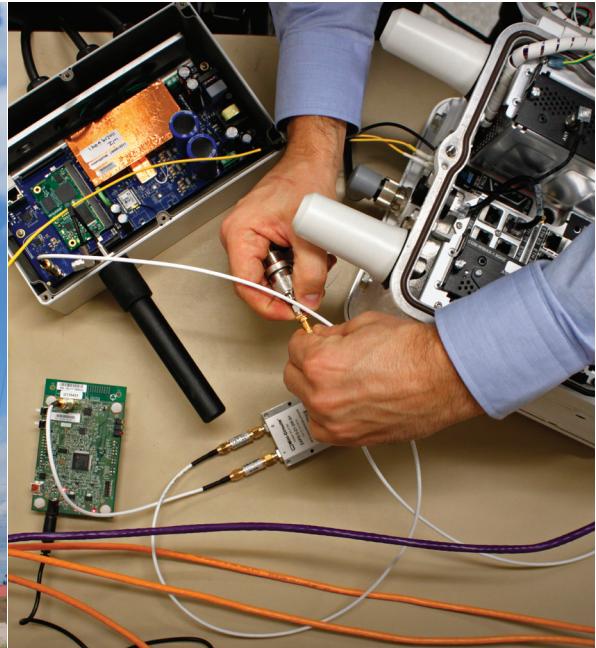
PowerTech
The Power of Trust. The Future of Energy.

Grid Modernization

GRID MODERNIZATION



Distribution Automation and Optimization Test Centre



Critical infrastructure communications

Reducing the risks of new technology in distribution engineering, planning, operations, and asset management

Advanced technologies are enabling utilities to leverage a new generation of distribution network equipment that provides intelligent monitoring and control and supports richer relationships with customers.

However, to fully exploit this connected nature of operations, utilities also need to address critical challenges, including: IT-OT integration, standards conformance, security and privacy, distribution automation and distribution optimization, communications technologies reaching to the field and neighborhoods, and demands and aspirations of intelligent communities enabled by the Internet of Things.

Powertech's Grid Modernization Sector is an independent, commercial testing and validation facility that offers testing, engineering services, and consulting expertise to support utilities in grid modernization. The sector collaborates with utilities, vendors, and Original Equipment Manufacturers "OEMs" in design, product development, technology evaluation, interoperability testing, and pre-deployment validation. These services reduce the risk of bringing advanced technologies to the industry.

The sector operates the Distribution Automation and Optimization Test Centre, one of the largest, outdoor, full-scale distribution

system demonstration facilities, and is currently supporting evaluation and testing of SCADA, Distribution Automation, Distribution Management Systems (DMS), and DMS applications, including Fault Location, Isolation and Restoration (FLISR).

Our team has first-hand experience in the design, implementation, and testing of IT-OT integration for large utilities in North America. The department evaluates new communications technologies for standards conformance, and our lab has capabilities to assess security and privacy implementation of communications systems for critical infrastructure.

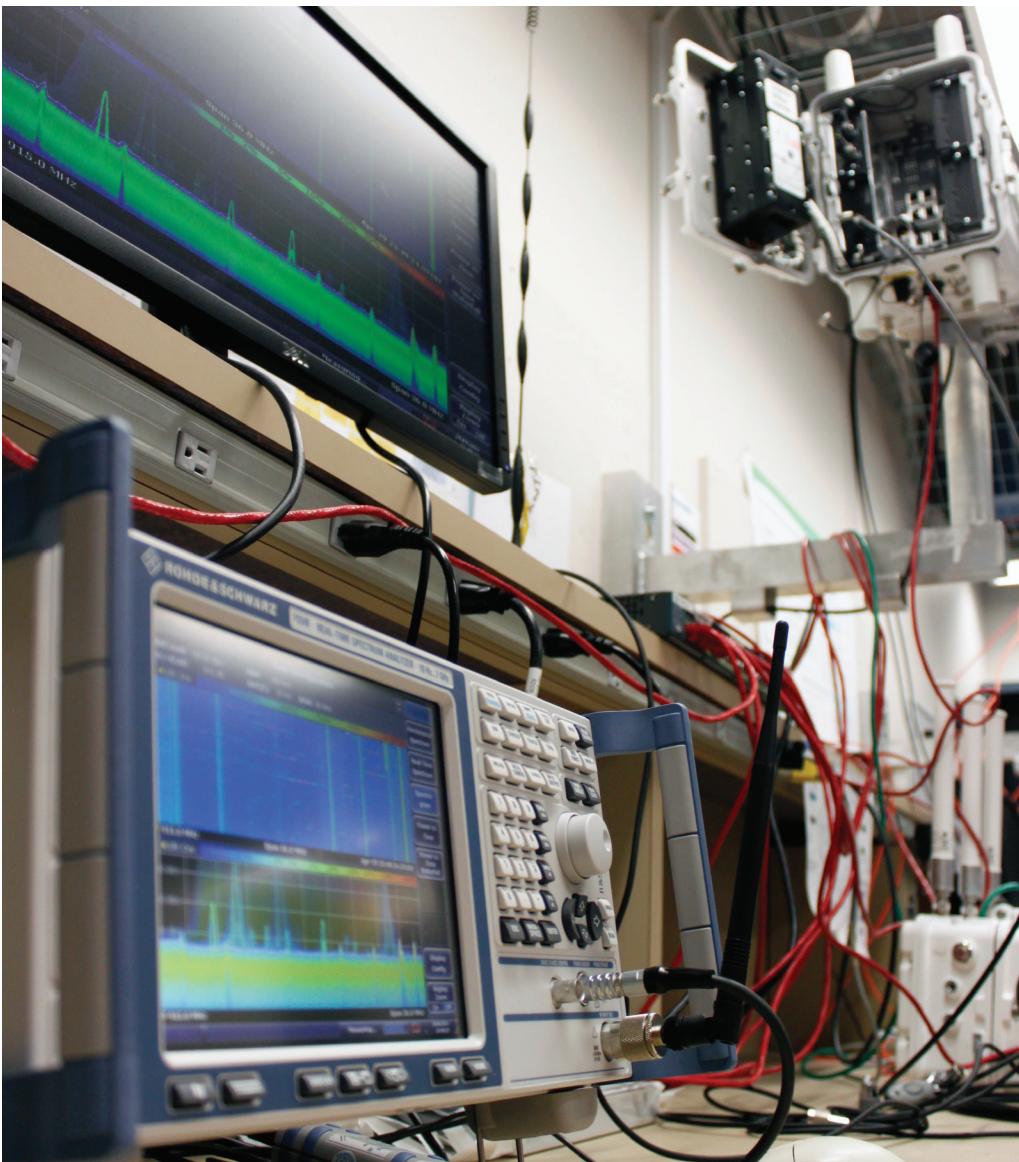
CONTENTS

04 Capabilities and Services

05 Capabilities and Services (Continued)

06 Offerings

07 Applicable Standards



CAPABILITIES AND SERVICES

Distribution Automation

Powertech's Distribution Automation and Optimization Test Centre is a fully energized, dedicated, medium-voltage model of a modern distribution system, with state-of-the-art and legacy grid and monitoring capabilities. The test yard allows utilities and vendors to develop, test, and demonstrate end-to-end distribution automation and control for Fault Location, Isolation and Restoration (FLISR). Services are available for testing emerging technologies in one location under real grid operating conditions. Our distribution automation portfolio includes automated switchgear, reclosers, fault locators, feeder meters, intelligent fuses, and pole-top RTUs, among other devices.



Critical Infrastructure Communications

Powertech's Communications Lab specializes in wireless and wireline technologies for critical infrastructure industries. The lab has outdoor and indoor lab facilities for design, network planning, and equipment evaluation, and validation of field devices and their communication links. This lab carries out system and network design, evaluates new communications technologies and products, and conducts in-house certification tests for third parties. Services include network design, procurement advisory, licensing application support, and advice on regulatory matters and commissioning.

End-Use Issues and Technology

Powertech's End-Use Lab specializes in customer-side technologies such as metering; distributed energy resources (DER) at residential, commercial and industrial sites; solar PV/battery systems; load shaping; demand response; and electric vehicle grid impact management. This lab also performs energy use studies, and conducts product validation and certification. Services include site assessment, energy efficiency design, and solution engineering.



AeroMACS



Power Quality

Power Quality Assessment

For commercial and industrial customers, Powertech provides power quality assessments to identify the cause of a disturbance, recommend mitigation, and calculate a return on investment (ROI). The assessment aims to detect one or more sources of the disturbance, one or more loads sensitive to the disturbance, and the channel for the disturbance to be propagated between them. The service includes site visits to deploy instrumentation and perform data collection on selected points; analysis of results using Powertech expertise, dedicated software, and a methodology complying with power quality standards; and a report with options to mitigate each power quality issue and a business case identifying the ROI.

Intelligent City Accelerator

The Intelligent City Accelerator (ICA) provides the expertise and facilities for rapid prototyping and validation of technologies for high-priority use-cases, utilizing smart lighting, sensors, analytics, and real-time monitoring networks. Services include testing and modelling technologies to manage demand response (DR), modelling DR for electric vehicle charging, intelligent street lights, and working with municipalities, utilities, and vendors to advance intelligent technologies for progressive cities.

AeroMACS Certification

Powertech Labs offers an AeroMACS (Aeronautical Mobile Airport Communications System) certification program, including Protocol Conformance tests (PCT), Interoperability Tests (IOT), and Radio Conformance Tests (RCT). Powertech has received ISO 17025 Accreditation for AeroMACS RCT, making it the only lab in the world to have this accreditation. AeroMACS is a broadband wireless technology for airport surface operations that is being adopted by the global aviation industry to upgrade its airport surface communication systems to keep pace with burgeoning demand.

Grid Modernization

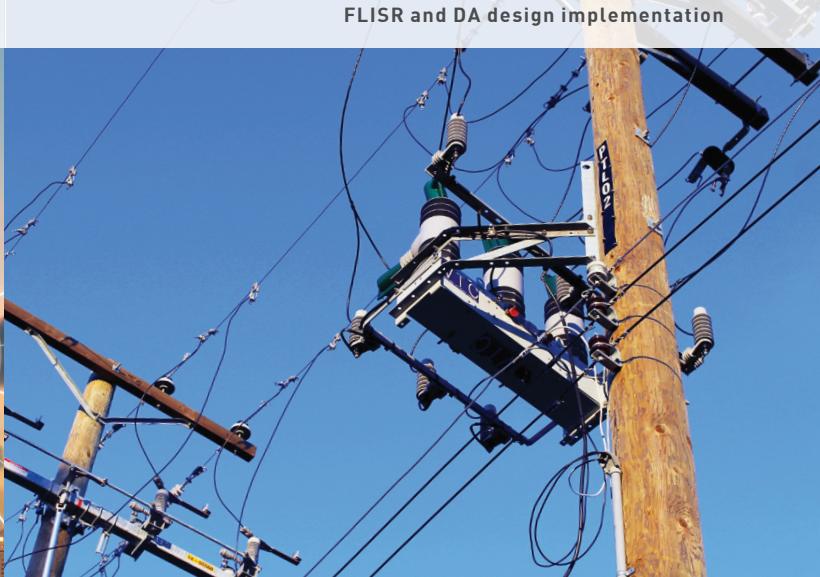
OFFERINGS

TESTS PERFORMED	LEVELS/BOUNDARIES
Distribution automation device configuration and validation	33 kV and below
End-use technology	Residential, commercial, industrial
Distribution operations security	RTU, SCADA, data concentrator, FEP
Critical infrastructure communication	RF, Wi-Fi, Cellular, WiMAX, AeroMACS

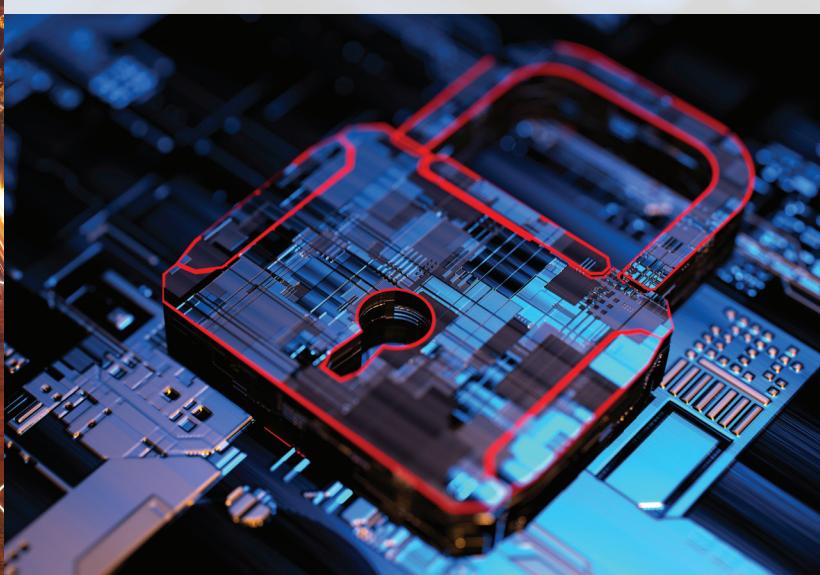
Intelligent City Accelerator



FLISR and DA design implementation



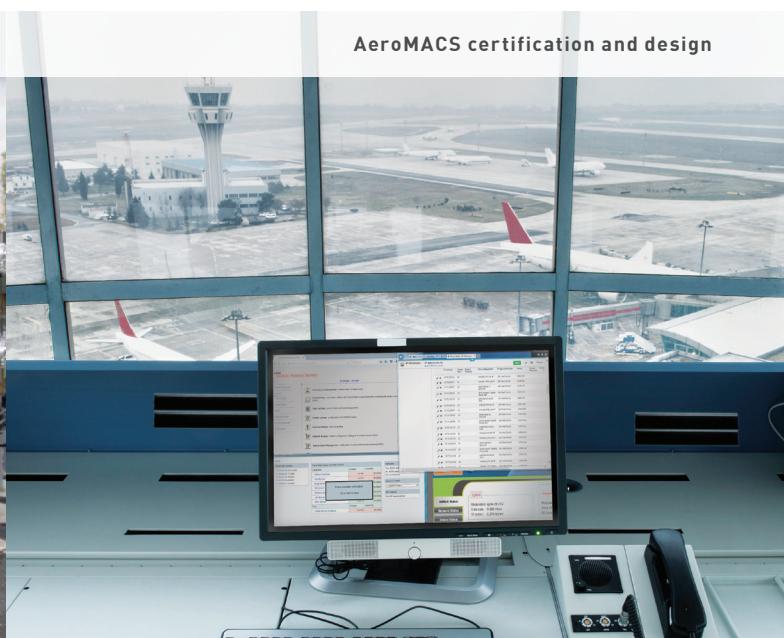
Cyber security for distribution devices



APPLICABLE STANDARDS



TEST OBJECTS	APPLICABLE STANDARDS
Metering	ANSI C.12
Line sensors	IEEE 495
Communication	LTE, WIMAX, WI-FI, SATELLITE
Network devices	NERC PRC, NERC CIP



THE POWERTECH ADVANTAGE

Powertech Labs Inc. is one of the largest testing and research laboratories in North America, situated in beautiful British Columbia, Canada. Our 11-acre facility offers 15 different testing labs for a one-stop-shop approach to managing utility generation, transmission and distribution power systems.

Powertech is home to a broad range of scientists, engineers, and technical specialists, with capabilities in electrical testing, cable condition assessment, mechanical and materials engineering, software technologies, power system studies, chemical analysis, gas systems engineering, and smart utility services. These skilled researchers have decades of collective and real-world experience and often work in cross-departmental teams to investigate, diagnose and solve complex problems.

As an independent, third-party testing facility, we adhere to the **highest** laboratory (**ISO 17025**), quality (**ISO 9001**) and environmental

(**ISO 14001**) management standards. Many of our scientists and engineers chair or participate in various standards committees within their fields of expertise. Additionally we have the capabilities to derive and develop **non-standard testing** methods and setups required to test product prototypes and perform forensic analysis.

Outside of the utilities industry, Powertech provides routine **testing** capabilities, product **development**, research and **consulting** services to support an array of industrial-type operations, electrical equipment manufacturers and automotive original equipment manufacturers.

