Advanced Transportation: Infrastructure Programs

Powertech

The Power of Trust. **The Future of Energy.**

HYDROGEN STATIONS

World's first 700 bar hydrogen station

Customer fueling at Powertech's 700 bar hydrogen station

As a leader in the design and construction of hydrogen fueling stations, Powertech's Advanced Transportation Department pioneered the design of turnkey, containerized hydrogen fueling station packages.

The hydrogen-fueled vehicle industry requires a fueling infrastructure with stations that are safe, efficient, reliable, and user-friendly.

This process streamlines station building by compiling and integrating the components at Powertech's facility, packaging them with control software, and testing the systems and components to deliver a safe and reliable plug-and-play system.

The department is also responsible for a number of firsts in the industry, which allow consumers to fuel their vehicles more easily and quickly and obtain more vehicle range.

For example, Powertech has helped to improve the technology for compressing hydrogen to a higher pressure, which allows more gas to be stored in a vehicle, thus increasing vehicle range. The department designed Canada's first station that increased hydrogen pressure from 200 to 350 bar, and eventually designed the world's first 700 bar hydrogen fast fill station, which today is the industry standard. This hydrogen storage pressure offers hydrogen-fueled vehicles with a range of up to 500 km (300 miles).

Among other milestones, the Advanced Transportation Department designed one of the first retail-style dispensers and the first hydrogen station capable of fueling four fuel cell vehicles simultaneously.

Beyond conventional hydrogen stations, the department designs and constructs other elements in hydrogen infrastructure such as hydrogen tube trailers for on-site fuel delivery.

Moving forward, Powertech continues to pioneer new technology. In a project with the U.S. Department of Energy, Powertech designed a next-generation, algorithm-based station testing device for optimized fueling.

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CAPABILITIES

High pressure hydrogen compressor

Hydrogen Station Equipment Performance Device

Destructive testing

The key capabilities of Powertech's Advanced Transportation Department are its extensive expertise in the following areas of hydrogen technologies:

- Design and fabrication of fueling stations—Powertech has the laboratory facilities and staff experience to design and build turnkey hydrogen fueling stations. Many station products—including dispensers, tube trailers, and mobile fuelers—are also designed and fabricated.
- Fueling support for vehicle OEMs—Powertech's experience with vehicle OEMs enables it to design stations to meet vehicle needs.
- Codes and standards development—Through the participation of Powertech managers and staff in the activities of standards committees, the department is familiar with the latest protocols and the future direction of the industry.
- Testing of fueling station components—Powertech's hydrogen fueling and systems testing labs include capabilities for standardized protocol tests and custom component tests.
- Safety studies and testing—In-house capabilities are available for safety testing, and Powertech was the first company in North America to get ETL National Fire Protection Association (NFPA) 2 certification for its station design.
- Software development—Powertech has the capability for developing control software for hydrogen stations and test systems, and for developing databases for collecting fueling data from vehicles and stations.

SERVICES

Hydrogen station fabrication

Hawaii 700 bar fueling station

The Advanced Transportation Department offers services for hydrogen station design and construction.

700 bar trailer

Designing and Installing Stations
Powertech designs and builds hydrogen fueling stations with flexible and customizable options such as hydrogen supply, storage cylinder type, dispenser type, and station size.

Testing of Vehicle and Fueling Station Components
The company's hydrogen fueling and systems testing lab conducts component and system tests for the simulation of hydrogen fueling protocols, end-of-life and durability testing, and performance tests to ensure the station package is safe and reliable. Connections are pressure-tested, and quality tests are conducted for different vehicle types and operating conditions.

Station R&D
Powertech engineers can design new capabilities for future stations and testing systems, such as the new Hydrogen Station Equipment Performance Device (HySTEP).

Trailers
Powertech designs and builds custom high-pressure hydrogen tube trailers for bulk hydrogen transport.

Consulting Support Services
Powertech offers online support services for the Powertech hydrogen stations using remote log-in capabilities. Powertech can also offer a range of consulting services around hydrogen infrastructure, including project development, site selection, and failure analysis.

STATION PROJECTS

Since 2001, Powertech has designed and constructed 12 turnkey, compressed hydrogen fueling stations across North America, including one current public retail location and three upcoming public stations in California. Powertech has partnered with a number of companies who were awarded California Energy Commission (CEC) grants by providing the hydrogen fueling station equipment.

The stations are designed to fuel 70 MPa fuel cell vehicles in accordance with industry standards as well as next-generation and custom fueling protocols.

Hydrogen tube trailer

700 bar station located at Powertech

Powertech hydrogen station at Newport Beach, California

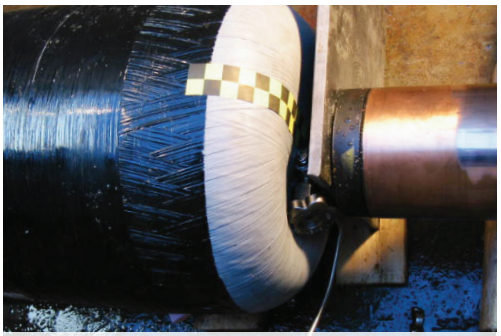
STATION TESTING

In-house testing to improve station designs

Powertech's hydrogen station designs are supported by engineers from the company's world-class high-pressure testing facilities, which are used to test fuel systems, high-pressure components, and fueling protocols for hydrogen systems. The technical experience gained from testing hydrogen vehicle fuel systems is applied to the design of the hydrogen fueling stations to ensure that Powertech stays on the cutting edge of technology.

Uniquely, for continuous improvement of station design, Powertech has access to feedback from three sources—the Testing group, the Fabrication group, and through the operation of its own station. This feedback is utilized to adjust and modify station designs for improved service and reliability.

Cylinder testing



Crush test

Bonfire testing

SELECTED CLIENTS

Shell

TOYOTA

HNEI
Hawai'i Natural Energy Institute

Berkeley
UNIVERSITY OF CALIFORNIA

PRAXAIR
Making our planet more productive

HTEC
Hydrogen Technology & Energy Corporation

ITM POWER
Energy Storage | Clean Fuel

Advanced Transportation-Infrastructure

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.

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