

## Fuel Cells and Materials Handling Applications

Fuel cell-powered forklifts are currently in operation at manufacturing plants, distribution centers, and grocery warehouses around the country, replacing incumbent battery-powered and combustion vehicles due to their advantages of longer runtime, faster refueling, and higher efficiency.

### Benefits

Fuel cells generate electricity using an electrochemical reaction, not combustion, so there are no polluting emissions, only water and heat as by-products.

One main advantage of fuel cell-powered materials handling vehicles is the productivity gains that a warehouse sees in switching to fuel cells. These efficiency gains are seen by both the elimination of lengthy battery change outs, replaced with just a three minute hydrogen refuel after a full eight hour shift, as well as elimination of voltage sag over time, even in freezer operations.

Warehouse operators are also able to recoup significant valuable warehouse floor space due to elimination of battery storage and charging areas by switching to fuel cell-powered systems.

### Current Fuel Cell Customers

There are currently more than 7,000 fuel cell-powered material handling vehicles either in operation or on order at manufacturing plants, warehouses, and distribution centers in 23 states around the country.

Customers include major companies such as Walmart, Sysco, Procter & Gamble, BMW, Coca-Cola, Central Grocers, FedEx, Bridgestone, Lowes, Mercedes, Volkswagen, Honda, Kroger, Wegman's, Whole Foods, WinCo Foods, and many others. Many companies have become repeat customers and are deploying fuel cell forklifts at multiple sites.

### Other Fuel Cell Logistics Applications

Fuel cells are also being evaluated to power transport refrigeration units (TRUs) in trials overseen by the U.S. Department of Energy's (DOE) Pacific Northwest National Laboratory. Participants include trucking companies Carrier Transcold and ThermoKing, food distributor Sysco, and grocery chain H-E-B.



Hydrogen Dispenser - Sysco Facility



Mobile Hydrogen Fueller and Forklift



Fuel cell powered materials handling equipment at BMW Manufacturing Plant – Greer, South Carolina