

## Material Handling

### Fuel Cells and Material 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 material 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 20,000 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 Amazon, Walmart, Sysco, Procter & Gamble, BMW, Coca-Cola, FedEx, Bridgestone, Home Depot, Lowes, Mercedes, Volkswagen, Honda, Kroger, Wegman’s, Whole Foods, and many others. Many companies have become repeat customers and are deploying fuel cell forklifts at multiple sites across the country.

#### Other Fuel Cell Logistics Applications

Fuel cells are also being evaluated to power transport refrigeration units (TRUs) and airport ground service equipment (GSE) in demonstration projects overseen by the U.S. Department of Energy (DOE). Fuel cell-powered drayage trucks are also being tested at the Ports of Long Beach and Los Angeles.



Hydrogen Dispenser - Sysco Facility



Mobile Hydrogen Fueller and Forklift



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