

# Plug Power Evaluates Energy Efficiency of Membrane Electrode Assemblies



## Plug Power, Inc.

Plug Power is an American company engaged in the design and manufacturing of hydrogen fuel cell systems that replace conventional batteries in equipment and vehicles powered by electricity.

## Challenge

Fuel cell technology converts energy from a fuel into electricity, with virtually emission-free operation. Used as both standby and primary energy sources, fuel cells provide power for a variety of different applications from backup power generation to transportation applications. Earlier prototypes of Plug Power's membrane electrode assemblies (MEA) were developed with reduced platinum content and evaluated for energy efficiency in converting hydrogen to electrical energy.

Plug Power updated the MEA design, focused on high volume manufacturing, and requested the New York State Pollution Prevention Institute (NYSP2I) to perform an evaluation of the energy conversion efficiency of this latest generation MEA to confirm the performance in their manufacturing process.

## Solution

NYSP2I, Rochester Institute of Technology (RIT), and Alfred State College supported Plug Power by providing a performance evaluation of Plug Power's energy efficient MEA constructed using their new high volume manufacturing process in Rochester, New York. Plug Power provided over sixty functional MEA prototypes from the manufacturing process during scale-up



Testing of Plug Power fuel cell membranes at Rochester Institute of Technology

## Challenge

- Plug Power requested a comparative performance evaluation of their high-volume membrane electrode assemblies (MEA) materials against baseline configurations

## Solution

- NYSP2I collaborated with RIT and Alfred State College to provide a performance evaluation of Plug Power's energy efficient MEA
- Specimens from selected MEAs were evaluated using scanning electron microscopy

## Results

- Work performed by NYSP2I and Alfred State allowed Plug Power to validate control limits for their high-volume manufacturing process for MEAs

## Testimonial

for performance evaluation. In addition, specimens from selected MEAs were evaluated using scanning electron microscopy to evaluate the product at a microscopic level, confirming the configuration of the membrane sample groups tested.

## Results

The work performed by NYSP2I, RIT and Alfred State allowed Plug Power to validate control limits for their high-volume manufacturing process for MEAs fabricated on a production line to meet energy conversion efficiency requirements. The observations from the testing and subsequent analyses are as follows:

- The MEAs manufactured by Plug Power exhibited consistent voltage measurements throughout NYSP2I's evaluation, which demonstrated the high-volume manufacturing process produced MEAs with consistent conversion efficiencies.
- MEAs fabricated by Plug Power using their high-volume production process exhibited energy conversion efficiencies equivalent to their existing lower volume manufacturing process.
- The output voltages for the Plug Power MEAs manufactured on their new high volume process were consistent for the current densities of interest at various temperature, humidity, and pressure test points.

*"The partnership with RIT and NYSP2I has been instrumental in our rapid scale-up from lab prototypes to full scale volume production. We value the resources, equipment, and technical know-how of the team as they continue to work with companies like Plug Power to optimize clean technology product/production innovations."*

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