

**Implementation of Ultrasonic Welders in Automated High Temperature
PEM Fuel Cell Membrane Electrode Assembly Manufacturing**

by

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ABSTRACT

In order for high temperature Proton Exchange Membrane (PEM) Membrane Electrode Assemblies (MEAs) to be successfully implemented and mass produced for use in combined heat and power units and other uses, there must be a dramatic drop in the price, as well as time, required to manufacture them. Early research has demonstrated the benefits of ultrasonically bonding PEM fuel cell MEAs, in terms of durability, unit cost and cycle time. With these improvements in performance, the next phase in the development of the process is to move from a laboratory setup to an automated production cell capable of producing larger volumes of fuel cells while maintaining a quality ultrasonic bond. The MEAs also need to be produced more affordably and with quality standards meeting or exceeding the level set by current best manufacturing practices. The design considerations for implementation of this production cell are covered, as well as a comparison of current ultrasonic bonding processes that were considered for use in the final design. The results of several experiments are analyzed to determine manufacturing parameters influential to the final design of the production cell. Future testing approaches are explored in relation to the next stages of process development.