

ONSI PC25TM Fuel Cell Power Plant Experience/ Status/Progress

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Abstract

Manufacturing of the PC25 fuel cell power plant began in 1991 and operation in on-site applications began early in 1992. Since that time, nearly 150 power plants have been delivered to customers in 13 countries throughout North America, Asia, and Europe, and the fleet has accumulated 1.5 million hours of operations.

Concurrent with the manufacturing and operating activity, the equity partners in ONSI have invested substantial resources in developing further improvements to the product and the supporting business capabilities. The most visible result of these activities is a new power-plant model, referred to as the PC25 C, which is one third smaller and lighter than the first power-plant model delivered to the market. Improvements to this model are in various stages of development, and introduction of these improvements will begin later in 1997. Sponsors of these improvements include Toshiba and United Technologies Corporation, who are owners of International Fuel Cells Corporation of which ONSI is a subsidiary, and a subsidiary of Ansaldo, who along with Toshiba and International fuel Cells, is an equity partner in ONSI.

The PC25 experience includes operation on natural gas, propane, light naphtha, and waste gas from waste-water treatment and landfill facilities, and hydrogen. The electrical configurations include both 60 and 50 Hz as well as grid-connected with automatic transfer to grid-independent operation in the event of a grid outage; other power plants have been operated as grid-independent units with transfer of the load to the grid in the event of a fuel cell outage. The product heat from the fuel cell has been used for domestic hot water, space heating, air conditioner reheat, and to drive adsorption air conditioners. A wide range of operating environments has been encountered, including temperatures from minus 40 to 128 Fahrenheit; altitudes from sea level to one mile above sea level; and shock and vibration from truck transport, transportation and rigging accidents, and earthquakes.

Durability and reliability statistics are encouraging. Individual power plants have operated for total periods in excess of 35,000 hours (over 4 years), confirming the long periods between overhaul, which has long been a projection for fuel cells. A few dozen continuous runs have exceeded six months and several have exceeded one year. The power plant incorporates diagnostics and data recording, which permit rapid restoration to operation after a forced outage. Remote control and diagnostics have been used to avoid shutdowns and to facilitate maintenance actions.

The PC25 is designed and fabricated in accordance with requirements developed by the American Gas Association Laboratories. These requirements are currently in the process of being upgraded to an ANSI standard. Other standards activities with the IEEE, ASME, are addressing interconnection, installation, and applications issues.

Improvements incorporated in the PC25 C model include a higher power density cell stack; improved cell stack manufacturing processes; an inverter utilizing IGBTs to reduce size and weight; a simplified and smaller fuel processor; compact heat exchangers; and an improved control system and improved packaging, including hinged panels for improved maintenance access. Further improvements under development are associated with these same components; these improvements will be inserted into production over the next few years. The improvements will also include broader operating capabilities associated with assured power applications.