

United States Army Operational Test Command Podcast: Fuel Cells in Testing

(Intro Music)

Interviewer [0:14]: Welcome to the United States Army Operational Test Command Podcast Series. In today's environmentally conscious world, everyone wants to go green. Even in the testing world, energy efficiency is something that is taken very seriously. In this episode, I talk to Mr. Henry Merhoff, senior systems engineer, senior technologist with the Transformation Technology Directorate of OTC. Henry talks about the use of fuel cells during operational testing.

(Music Interlude)

Interviewer [1:16]: So Henry, just tell me, how did OTC get involved in the fuel cell?

Henry Merhoff [1:20]: The mission of the Operational Test Command is to conduct tests and evaluations and collect data for systems that the Army is acquiring. When we do that, we must conduct those tests in the real environment, that is, in field environments, using real soldiers operating their real systems. Historically, to power the test instrumentation while those tests are being conducted, we have either connected to the vehicle power and used that vehicle power to charge batteries to power test instrumentation, or we have used stand-alone batteries to power the test instrumentation. Both of these alternatives are costly and use more manpower than we would like to use during the conduct of a test. So, we felt there was a need to find an alternative power source.

Interviewer [2:36]: How did you go about getting the fuel cell, the specification? I know you said it was a German company that developed it.

Henry Merhoff [2:44]: Actually, it started sometime before that. What we first had to determine was the outline of a requirement. You know, we knew we had a need to provide alternative power. I translated that need into specific technical requirements—so much watts for so many hours, uh, size, weight—and using the Department of Defense Test and Evaluation Science and Technology program, I asked the Jet Propulsion Lab in Pasadena, California, who had been the originators of methanol fuel cells for the Defense Advanced Research Projects Agency, to build me an integrated fuel cell in a box. By that, I mean the fuel cell operating unit, the fuel compartment or fuel container, all of the pumps, valves, was all in a single box. Uh, that had never been done before at the 250-300 watt level and 24 volts. This took about 18 months. It was partially successful. We did not achieve the power we wanted, but we did achieve putting everything in a single box. As I said, it had never been done before.

That enabled us to define the issues involved in future development as well as the priority of the technical specifications. We then went to industry and said, "What is your technology?" We had 14 companies tell us what they were doing. We then determined that the technology was at a level that we could proceed with an acquisition and then put out a request for competitive procurement, evaluated the responses, and selected Smart Fuel Cell, Munich, Germany to build prototypes.

Interviewer [5:39]: So far, what has OTC done as far as incorporating the fuel cell in some of the operational tests?

Henry Merhoff [5:47]: We've done really two things with regard to the 250-watt fuel cell from Smart Fuel Cell. Uh, we call it the FC250. We have demonstrated the FC250 prototypes at various shows to show people how a fuel cell could be used and is being used within Operational Test Command. And we have ordered additional limited-rate production units for delivery this year to support FCS tests in the summer. In addition, as a parallel effort, we have ordered commercial units to be connected with solar panels. And that has provided power for video cameras, microphones, transmission equipment at the... at a Fort Bliss training village for urban warfare test and training. It is the first use of fuel cells or a hybrid power system—fuel cells and solar panels—in the Army.

Interviewer [7:22]: What are some of the advantages of going this route and using these fuel cells for operational testing?

Henry Merhoff [7:29]: Well, there's really two principal ones. One is a cost reduction over the long term. Fuel cells over a three-year period are roughly half the cost of using batteries or using batteries powered from vehicles. Second, using an alternative power source does not interfere with the vehicle system under test, which is highly desired by the program managers. And third, the manpower required to support fuel cells in the field is substantially less, with of course, less cost, lower cost, than using batteries because of reduced personnel required to support it.

Interviewer [8:34]: In the overall Army, do you see the fuel cell becoming something that could be incorporated in other areas outside of operational testing?

Henry Merhoff [8:44]: Yes, without a doubt. But we have to conduct experiments, demonstrations, and see where it will fit and where it won't. For example, I believe that a combination of fuel cells and ruggedized solar panels could replace some of the generators used at a tactical operation center.

Interviewer [9:20]: Now, as far as actual soldiers in theater, I know you and I've talked before that there are some efforts being made to make it smaller so that it could possibly be used in actual tactical operations.

Henry Merhoff [9:34]: Yes, the FC250 is a large unit. It's 36 inches long. We are pursuing a program to develop a lightweight, smaller unit, which will be 18 inches long and suitable for carrying by one person without fuel. So it will fit in the back of a Humvee or in areas on tactical vehicles where the space is restricted. It produces less power, but it still will run for 100 hours.

Interviewer [10:20]: Out on tests, what kind of equipment, what does the fuel cell power? What can it be used as far as? Is it data analysis equipment or what is powered by the fuel cell?

Henry Merhoff [10:31]: Well, it's a variety of things. Field data collectors, video equipment, real-time casualty assessment sensors. There is, uh, laptop computers, screens, basically anything that can be powered from either 12 or 24 volts with a maximum of 100 for the lightweight unit or 250 watts for the FC250 could be powered. And obviously, you could use multiple units if needed.

Interviewer [11:24]: As far as how the Army's evolving, what are your goals for the fuel cell program? How do you see it being incorporated into the Army's revolution and how they're evolving?

Henry Merhoff [11:35]: I feel that ATEC is leading among others' development, and we are, uh, involved with CERDEC and the portable power program within the Army. We do have our own specific requirements, uh, as do they, and they are somewhat different, but the basic technology that we would both use is similar.

Interviewer [12:12]: The fuel cell is considered green, which is something that everywhere you see coming up. Tell me a little bit about how it's green and how that can help the Army go to the green way of thinking.

Henry Merhoff [12:26]: Well, first of all, it does not put out anything except a small amount of carbon dioxide and water. There is no harmful emissions, which some other fuel cells do have. Second, it uses a relatively available fuel, methanol. It's, it's very easy to operate and maintain. So it's, it's a silent generator. Very, very quiet. You have to almost be not more than a foot or two away from it to hear it, and its thermal signature is very minimal. Again, these are desirable qualities in operational test instrumentation because we do not want to interfere with anything occurring in the test.

Interviewer [13:51]: Is there anything else that you'd like to add about the fuel cell and the fuel cell program?

Henry Merhoff [13:57]: I guess I believe that we're only starting to see the future of alternative power within the Army, and I guess I've been very fortunate to be one of the

pioneers and OTC to be one of the initial driving organizations for its development and introduction into the Army.

(Outro Music)

Interviewer [14:52]: That concludes this episode of the United States Army Operational Test Command Podcast Series. If you enjoyed this episode, please visit <https://atec.army.mil/operational-evaluation-command/oec-news/> to download more podcasts. Thanks for listening.

(Music Fades Out)