



Innovative Solutions For Your Critical Power Needs

Our Fuel Cell Journey “From Theory to Mass Deployment”

Matt Ulrich – Technical Sales



Who is RedHawk Energy?

- Formed as a value-added manufacturing subsidiary of the **Arthur N. Ulrich Company**.
- We specialize in the *application, design, development and supply* of Advanced Energy Systems for critical infrastructure markets in the US & Canada.

- Solar PV & Wind Systems
- Fuel Cells
- Stirling Engine Generators
- Thermoelectric Generators
- Ultracapacitors & Hybrid Ultracapacitors
- Battery Enclosures & Boxes
- BESS and Microgrids



Our Parent Company



- Founded in 1958 by Art Ulrich Sr.
- Today is 3rd Generation Family-Owned, Operated & Managed Manufacturer's Rep Agency based in Pataskala, OH.
- Technical Application and Sale of High Integrity AC & DC Power Systems
- Ohio & Surrounding States:
 - Healthcare, Data Centers, Telecom, Utilities, Oil & Gas, Rail Transportation (All US & Canada), Govt Agencies, Schools & Colleges, WTP/WWTP



RedHawk's Fuel Cell Journey

- How'd we get involved with **Fuel Cells**?
 - In the early 1990's we began searching for alternative energy systems to hybridize our Solar (PV) Power Systems in lieu of maintenance-intensive gas/propane generators.
 - This began a series of partnerships over the years with **many** Fuel Cell companies.
 - Focus mainly on low wattage systems – 250W-10kW for backup power as “**battery tenders**”



Solar (PV) is a reliable source of DC power when the sun is out, but what happens in the winter months and during periods of inclement weather?



Challenges We've Faced

- Slow Customer Adoption of New Technology
- Sticker Shock \$!
- Fuel Cell Manufacturers Willingness to Manufacture Fuel Cells
- Limitations of Fuel Cell Technology
 - Stack Life
 - End-of-Life Replacement
- New Technologies Constantly Entering Market



RedHawk's Fuel Cell Journey



RedHawk's Fuel Cell Journey – Plug Power

- Based in Latham, New York.
- Founded in 1997.
- Proton Exchange Membrane (PEM) Fuel Cell - 1kW+
- Test Site picked out for lower wattage (Under 500W) system.
- However, at that time Plug did not have a low wattage system available and/or wanted to pursue for our market and we went our separate ways.





Innovative Solutions For Your Critical Power Needs

Our Fuel Cell Journey 2000 - 2010



RedHawk's Fuel Cell Journey – IdaTech

- Based in Bend, OR
- Late 90s into early 2000s
- Proton Exchange Membrane (PEM) Fuel Cell – iGen
 - 250W @ 12V and 24V
 - LiquidPlus Fuel = Mix of water and methanol
 - 15 minute startup
- Generated interest and trial opportunities with customer base.....but.....



RedHawk's Fuel Cell Journey – Ballard

- Acquired IdaTech in August 2012.
- Ballard acquired IdaTech's reforming technology (production of hydrogen from water and methanol)
 - Move intended to allow Ballard to market backup power systems with built-in hydrogen generation capabilities
- Unfortunately, Ballard decided to eliminate iGen (250W) product from portfolio to focus on larger wattage systems.



BALLARD



EjectaGen ME 2.5kW
Fuel Cell Trial in AZ





Innovative Solutions For Your Critical Power Needs

Our Fuel Cell Journey 2008-Present



RedHawk's Fuel Cell Journey – AMI



- Founded in 1999 in Ann Arbor, MI
 - RedHawk began to work with in late 2000s.
- Spinoff of University of Michigan graduates, started making Solid Oxide Fuel Cells in a garage!
 - **AMI** – Adaptive Materials Inc.
 - Heavy into DOD and DOE Grant Programs
 - Soldier power and drones
 - Solid Oxide Fuel Cell (SOFC)
 - Can operate off or propane or natural gas
 - 50W to 500W Systems
 - ROAMIO P250i Performer Series – 250W @ 12/24/48V DC



RedHawk's Fuel Cell Journey – Ultra Electronics

- AMI was acquired by **Ultra Electronics** in 2010.
- **Ultra Electronics** is a British defense and security company located in Columbia City, IN.
 - Struggled with wanting to continue production of P250i
 - Turned away a large order we placed.
 - Wanted to focus attention on their more lucrative defense business, not so much standby power.
 - Attended a trade show with us and discovered there is an interest and opportunity for SOFCs in our markets and reversed course to accept our order, but would the confidence last?



RedHawk's Fuel Cell Journey – Adaptive Energy



- **Ultra Electronics/USSI** discovered they didn't like being in the Fuel Cell business and were looking to exit or have the business unit acquired.
- Sold business to a venture capitalist firm (Sleeping Bear Capital) in 2019 and formed Adaptive Energy.
 - Kept some personnel (thankfully!)
 - Manufacturing/integration returned to Ann Arbor, MI
 - P250i continued in its 3rd Generation



RedHawk's Fuel Cell Journey – Edge Autonomy

- To Our Surprise **Adaptive Energy** was purchased by **Edge Autonomy** in 2022.
 - Edge Autonomy develops and manufactures autonomous and unmanned systems for military, civilian, and academic applications.
 - Integration of SOFC into Drones
 - Fuel Cells under “Energy Systems” umbrella of Edge.
 - P250i now in 4th Generation
 - Improvements to customer interface – easier setup
- Edge Autonomy acquired by Redwire in January 2025 but will retain Edge Autonomy branding.





Innovative Solutions For Your Critical Power Needs

Our Fuel Cell Journey 2017-Present



RedHawk's Fuel Cell Journey – WATT

- Founded in 2010 in Long Island, NY
- WATT moved to Western Pennsylvania in April 2014 after acquiring established fuel cell developer Pittsburgh Electric Engines Inc. (PEEI).
 - RedHawk partnered with WATT in 2017.
 - Offered larger wattage Solid Oxide Fuel Cells
 - 500W & 1.25kW
- WATT would spend next 5-6 years on R&D and production plans before launching a commercial product
 - Additive Manufacturing Process (AMP)



Fun Fact:

Early WATT SOFCs were used for Boats & RVs



RedHawk's Fuel Cell Journey – WATT



- In 2023 WATT launched their REMOTE™ product line in addition to their HOME™ and NOMAD™ SOFCs
- We market their REMOTE™ units
 - 500W @ 12V
 - 500W @ 48V
 - 1.25kW @ 48V
- Several Trials Lined Up for End of 2025
- **Q1/Q2 2026 Availability**
- Fun Fact: May be able to operate off of hydrogen in future!





Innovative Solutions For Your Critical Power Needs

Our Fuel Cell Journey 2022 - Present



RedHawk's Fuel Cell Journey – GenCell

- Founded in 2011 in Israel
 - RedHawk became a strategic partner with GenCell in 2022.
- Alkaline Fuel Cells (AFC)
 - 5kW – 10kW
 - 48V DC
 - Operate off Industrial-Grade Hydrogen (99.95%)
 - Creating Hydrogen-On-Demand from Anhydrous Ammonia
 - Platinum-Free Catalyst
 - One of the Most Efficient Types of Fuel Cells
 - AFC: up to 60%, 87% with CHP
 - PEM: 40%-50%
 - SOFC: 55%-60%



In Closing – What Have We Learned?

- Fuel Cells are a Volatile Market!
- Adoption of Fuel Cells Takes Time!
 - Patience
 - Persistence
 - Selling Benefits & TCO, Not Fluff!
 - Supporting Your Customers During Issues
 - Finding the Right Manufacturers/Partners
- Expect Change & Adapt Quickly!



Questions & Thank You!



Matt Ulrich

RedHawk Energy Systems, LLC
10340 Palmer Rd. SW
Pataskala, OH 43062

740-964-4000 (office)
614-325-4162 (cell)

mmulrich@anu-co.com

www.redhawkenergy.net

