Alternative Energy : Fuel Cell Recuperator

The Objective

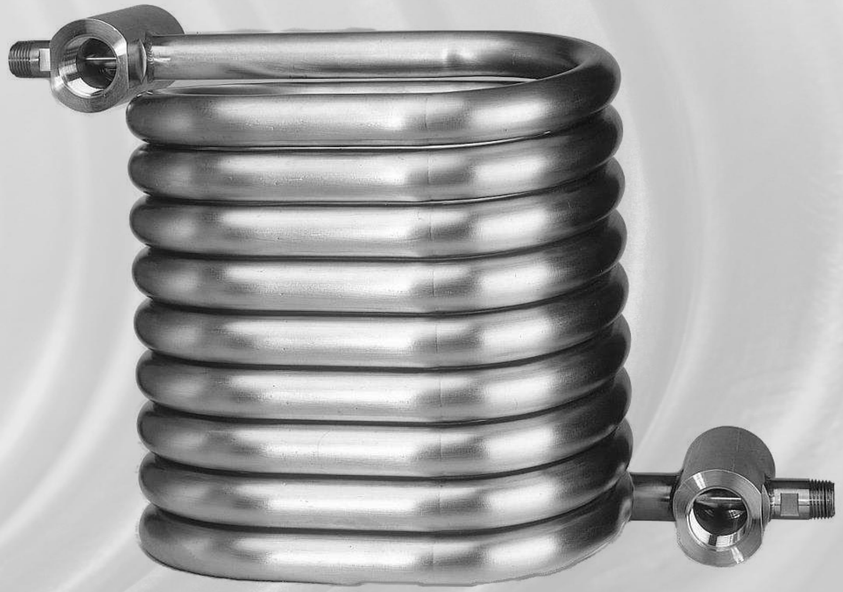
A major developer of fuel cell technology required a heat exchanger capable of cooling a hot gas mixture at 1200°F and water at 0.108 psi to a reasonable temperature. The system needed to function as a regenerative heat exchanger, recovering heat from the outgoing stream to preheat the incoming gas supply to the fuel cell.

The Challenge

The application involved handling extreme operating conditions with high temperatures and high thermal stress. The design needed to accommodate small geometry to fit within a tight envelope, while ensuring durability and low maintenance in a demanding environment.

The Solution

Exergy engineered a custom tube-in-tube heat exchanger tailored to the client's specifications. The inner tube was constructed from Inconel 600 for superior resistance to high temperature and thermal stress, while the outer tube was manufactured from 316L stainless steel for corrosion resistance and durability. Custom fittings were also designed and welded to tube ends to ensure seamless integration into the fuel cell system.



The Results / Benefits

The custom recuperator effectively recovered heat from the hot gas stream and successfully preheated the incoming fuel cell gas, thereby improving system efficiency. The compact and rugged design provided reliable operation under extreme conditions with no maintenance requirements.

Conclusion

This case highlights Exergy's ability to deliver customized, high-performance heat exchangers for advanced energy applications. By leveraging expertise in material selection and precision engineering, Exergy created a solution that met stringent thermal, spatial, and operational demands, enabling greater efficiency in fuel cell technology.

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