

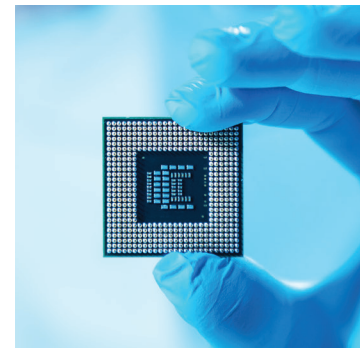
CASE STUDY

CUSTOM FLEXIBLE LEAD HEATER SOLUTION FOR SEMICONDUCTOR SOCKET TEST FIXTURES

Overview

A global supplier of burn-in sockets, production connectors, and high-density connectors was looking for a partner to develop a solution for a specific technical challenge; namely to provide a small form factor heating element that would improve the effectiveness and speed of their test system, allowing for increased throughput and decreased failure rate of heaters during their strenuous testing protocols.

The company was interested in Backer Hotwatt's advanced heating element technology and looking for an innovative solution that offered longer life, more uniform temperatures, and faster heat-up time.



Challenge

The company required a heating solution for an existing legacy customer's semiconductor socket test fixture application. They were impressed with Backer Hotwatt's unique SunRod heater product line, which can produce heating elements as small as .5" long with a diameter as small as 3 mm.

These heaters are unique not only in their form factor, but in their high heat capacity and long service life. One of the design challenges that presented itself was the ability of the heater to withstand the 10,000 cycles of opening and closing of the socket that the heater is exposed to during its test life. Many heaters will have their connections break after just a few thousand cycles.

Solution

To meet the design requirement of fully flexible connections, Backer Hotwatt engineers first designed a heater with flexible wire that could be spliced to the existing solid lead. The first batch of samples was shipped to the customer, but they found that the splice fell too close to the flex points and could not be used.

Advantages of the SunRod heater's patented high-temperature design include:

- When energized, the **patented split-sheath expands** into contact with surrounding bore for maximum heat transfer and fast response.
- When de-energized, the **split-sheath contracts** for easy, slide-out removal. SunRod heaters are guaranteed never to seize in the bore.
- Uninterrupted hot zone and **fully heated tip** provides unmatched heat distribution without cold spots.

Determined to find a solution, the engineering team went back to the drawing board and built a true, fully flexible SunRod micro cartridge heater that showed no degradation in performance when compared to other heaters that were tested. Armed with working samples, Backer Hotwatt met with the customer's R&D group at the 2024 TestConX EXPO. Excited at the possibilities of the innovative new design, the company asked Backer Hotwatt to provide additional samples for flex and electrical testing.

Outcomes

To prove the superior performance of the new design, the Backer Hotwatt engineering team built a test bench with the customer's fixtures and components and performed side-by-side testing against the leading competitor. The results proved that our design is superior in its ability to survive the severe testing protocol, and it is a measurable improvement in overall performance. A detailed report was provided to the customer along with our validation samples.

Hotwatt successfully met the challenge of creating a custom heater that enabled the customer to provide a more advanced, precise heating solution, while keeping the original test socket fixture design in place.

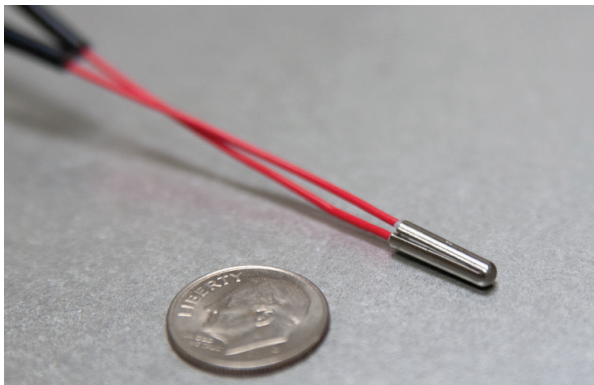
Successful outcomes include:

- More durable, robust lead wires that withstand 10,000 flex cycles.
- Sunrod's unique design allowed the customer to eliminate the use of thermal grease in the testing protocol, which greatly reduces the risk of test failure and contamination of the test device.
- Time to reach target temperature was reduced, allowing the customer to improve their test-cycle rate.

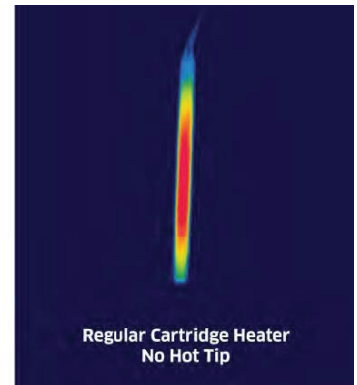
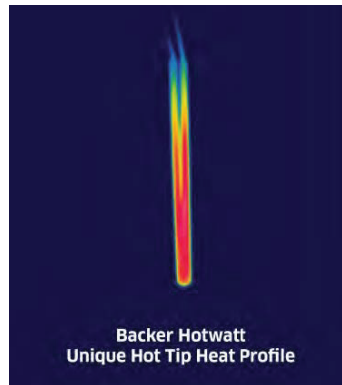
Backer Hotwatt helped the company solve a unique engineering challenge, and in the process, created an exciting new flexible lead technology with promising market opportunities. Backer Hotwatt's willingness to tackle complex technical challenges and commitment to small- and high-volume custom work is what sets us apart in the industry.

Our collaborative partnerships with customers enable the discovery and production of advanced heating solutions that our competitors—who typically won't take on custom projects—can't match.

NIBE/Backer Hotwatt offers highly innovative technologies in our product lines that solve major industry problems. The SunRod micro cartridge heater—unique for its small form factor and heat capacity—is just one example of how our engineering ingenuity helps speed development times and advance miniaturization for the semiconductor industry.



Backer Hotwatt's micro-cartridge heaters are the smallest in the world, and yet, they produce more heat than anything else on the market.



The unique design of the SunRod micro-cartridge heater's heated tip allows for better heat transfer and faster heat up times, reducing cycle times in semiconductor test applications.



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