

ADVANCED COOLING TECHNOLOGIES

The Thermal Management Experts | www.1-ACT.com

REVOLUTIONIZING HIGH-TEMPERATURE NEUTRON EXPERIMENTS

Fundamental research in extreme temperature environments is essential for various scientific and industrial applications. The need for advanced characterization techniques, such as neutron scattering, is essential to study materials under extreme conditions. These conditions, often reaching temperatures as high as 1700 °C, are relevant in fields such as materials science, metallurgy, chemical reaction kinetics, condensed matter physics, and much more. With such wide applications, there is a large demand for high-temperature neutron experiments at large facilities such as Oak Ridge National Laboratory. However, due to the limited neutron resources, most facilities remain overbooked and have lengthy waitlists for users to run experiments. One of the primary challenges faced in high-temperature neutron furnaces is the time-consuming cooldown of the test furnace. The vacuum environment in these furnaces lead to slow radiative cooling rates, especially when cooling from 1000 °C to 100 °C. The substantial cooldown time at these temperatures can take 2-3 times longer than the actual experiment itself, causing a significant waste of valuable neutron beam time and limiting the number of experiments possible.

COOLING YOUR FURNACE IN RECORD TIME SO YOU CAN EXPERIMENT MORE

Advanced Cooling Technologies, Inc. | 1046 New Holland Avenue, Lancaster, PA 17601, USA Phone: 717.295.6061 | Fax: 717.295.6064 | ISO 9001 & AS9100 Certified | ITAR Registered

COOLING INNOVATION

Advanced Cooling Technologies, Inc. (ACT) has developed a groundbreaking cooling technology that addresses this challenge. This advanced cooling system circulates a neutron-friendly gas through the internal furnace body and onto the sample, dramatically reducing the cooldown time by a factor of 30. This significantly enhances the throughput of neutron experiments, allowing users to perform more experiments in the same amount of time.



Drastic Reduction in Cooldown Time

ACT's cooling system has been rigorously tested at ORNL and demonstrated a remarkable 33x reduction in cooldown time from 500-100°C, taking just ~4 minutes compared to the standard 134 minutes with no cooling cart.



Rapid Cooling at High Temperatures The technology also enables rapid cooldown from 1500-100°C in just ~11 minutes, ensuring minimal downtime between experiments.



Precise control over cooling rates

ACT's technology allows precise control over the cooling rate, including the capability to perform a constant, linear cooldown, a functionality missing from the current state-of-the-art.



Hands-Free and Remote Operation Through close integration with the facility's control server, ACT's system allows for completely hands-free and automated operation of both heating and cooling processes, enhancing efficiency and convenience.



Modular and Mobile Cooling Solution Can be installed on existing furnaces without many hardware changes.



Return of Investment < 1 year (based on assumptions in the commercialization plan)

REDUCE YOUR COOLING TIME FROM HOURS TO MINUTES

PICTURED IS ACT'S COOLING CART COOLING A NEUTRON FURNACE AT OAK RIDGE NATIONAL LABORATORY



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