BOX Scientific

Application Note

Heliport Thaw Station

Human Blood Processing

Abstract:

While practices around the handling of blood serum and plasma have existed for some time, advances in the type and quantity of tests available continue on a rapid upward trajectory. Combined with the push towards greater efficiency and higher throughput environments, these factors necessitate the need for advancement of historical handling practices.

Thawing serum and plasma samples from a frozen state is one of the most notable time costs in many processes. Applying the rapid thawing capabilities of the Heliport thaw station from Box Scientific provides a means to greatly reduce thaw times of frozen serum and plasma specimens while preserving specimen integrity.

Background:

Blood serum and plasma are both easily attainable and contain a multitude of components that can be utilized in a variety of clinical applications, from drug testing to genomic assays. Quantities sufficient to run a multitude of tests can be easily obtained and reserves are easily stored. As such there is a widespread prevalence of clinical processes that center around analysis of blood serum and plasma.

Despite this widespread use of blood serum and plasma in clinical processes, processes around storage and handling remain relatively unchanged. However as clinical processes continue to push the limits of both speed and sensitivity, the shortcomings of these historical practices increasingly become a liability to quality, efficiency and ultimately profitability.

Perhaps the best illustration of these shortcomings is observed in the process of thawing cold-stored serum and plasma prior to use. Historical practices range from benchtop thawing , to thawing in water baths, to even the use of microwaves. However each of these methods requires some tradeoff of speed for quality or vice versa. None fully provide rapid thawing while assuring a consistent and reproducible physical state and assuring maximum specimen integrity.

BOX Scientific

Application Note

Box Scientific
www.boxscientific.com
408-361-8631

Procedural Focus:

Acknowledging the shortcomings of historical practices, opportunities for improvement should center around:

-Reducing overall thaw cycle time

-Maintaining maximum specimen integrity

-Minimizing variations in handling conditions

-Assuring consistent physical properties of specimens entering the process

Methodology:

Heliport Thaw Station– The Heliport thaw station is unique in its ability to address all of these factors simultaneously with no tradeoffs between quality and efficiency. The method by which it accomplishes this is twofold:

-By applying ambient air convection it significantly reduces thaw intervals without compromising specimen integrity by maintaining a stable thermal gradient with no application of external heat.

-By thawing to a condition of ambient equilibrium it leaves thawed samples in a consistent physical state that is highly reproducible across long timescales and across laboratories. And because equilibrium cannot be overshot, it is tolerant of procedural variation.

This methodology is superior to historical practices for a host of reasons as illustrated in the Table 1. It is well understood that putting frozen samples into a bath will lower its temperature. As such baths must continuously apply heat inputs to maintain the desired temperature setpoint. This can put samples at risk and will not yield a highly reproducible final condition. Microwaves excite the aqueous component of specimens, and can significantly reduce thaw times. However the endpoint is not controllable, or reproducible. And while samples left on the benchtop for long enough will ultimately achieve an equilibrium condition, the time cost is significant.

BOX Scientific

Application Note

Box Scientific
www.boxscientific.com
408-361-8631

Comparison:

	Benchtop	Water Bath	Microwave	Heliport
Thaws samples in 30 minutes or less	X	O	O	O
Maintains steady thermal gradient throughout the thaw process	X	X	X	O
Does not utilize external heat or thermostatting	O	X	X	O
Yields a consistent thermal state across entire sample set	O	O	X	O
Yields a consistent thermal state across multiple sample sets	O	X	X	O
Equilibrates samples to ambient test conditions	O	X	X	O

Table 1. Pros and Cons of Common Thawing Techniques

Applications:

CRO Customer-In mid 2014 a Heliport evaluation, a CRO customer processed 2400 frozen serum samples through a high throughput screening assay in just 4 hours. Not only did this exceed their average sample throughput by 100%, but improved data resolution was attained due to the consistent physical state of sample inputs.

Pharma Customer – In early 2014 pharma customer implemented the Heliport as their standard thawing component in their compound management infrastructure. All serum and plasma samples stored in house are thawed on Heliports prior to screening in a variety of research and development capacities. The result has been measurable gains in efficiency and sustained sample integrity.

ARUP National Reference Laboratory– Home to the worlds largest capacity sample repository, since 2007 the ARUP National Reference laboratory has used ambient air convection as their standard practice for thawing serum and plasma samples for a menu of over 100 blood screening tests. Delivering ambient air in an identical manner to the Heliport, their automated mix/thaw workcell has thawed hundreds of thousands of specimens since its implementation. It was also endorsed for serum and plasma thawing by the College of American Pathologists in 2008. And it has provided proven, measured gains in reproducibility and specimen integrity.

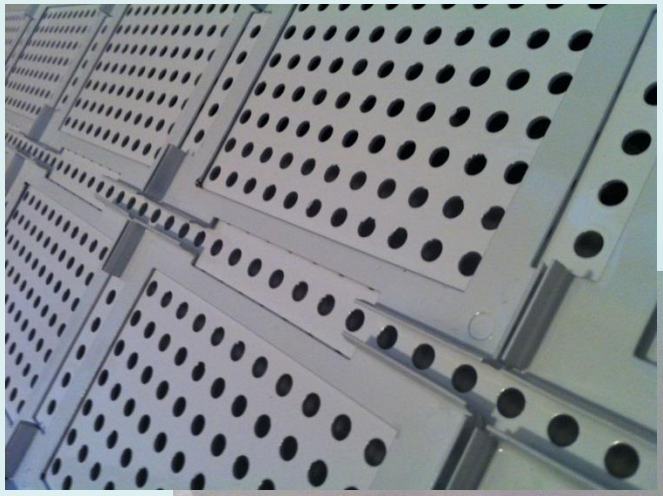
BOX Scientific

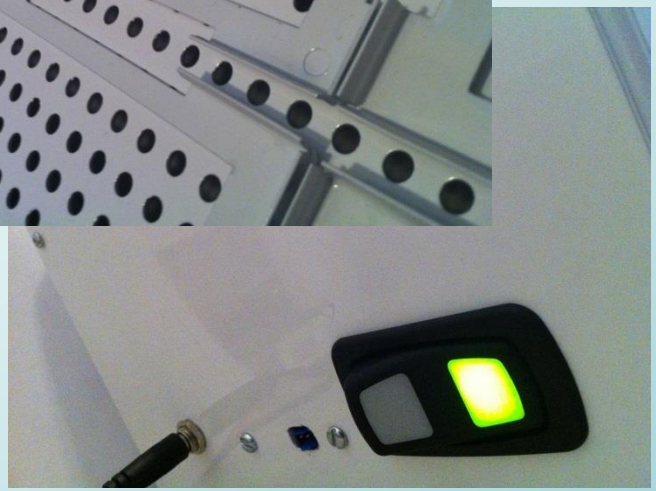
Application Note

Box Scientific
www.boxscientific.com
408-361-8631

Conclusion:

The thawing of serum and plasma samples by ambient air convection continues to prove superior to historical methods. Applied across a broad spectrum of processes and disciplines, this manner of thawing consistently yields measurable improvements in quality, efficiency and reproducibility when compared to conventional methods. And given its growing adoption as the method of choice across many industry segments, it is fast becoming the new standard of the world.





Contact US:

To learn more about the merits of convection based thawing, visit our website at www.boxscientific.com. Box Scientific offers multiple thawing solutions targeted to clinical processes of every variety and scale. From simple benchtop units to large platforms with automation integration capabilities, we have solutions suited to every purpose. Additionally we offer a variety of accessory components and even custom solutions to assure you the most comprehensive solutions for nearly any sample type and any container or enclosure . This is all part of our mission to help you “Thaw Right”.

BOX Scientific

Application Note

Box Scientific
www.boxscientific.com
408-361-8631

Heliport Specifications:

Product:	Heliport thaw station
P/N:	300-70000
Dimensions (cm):	
L	76.5
W	19
H	13
Power Source:	120VAC to 12VDC/3.0A wall wort
Power Requirements:	12VDC/1.4A
Fans	7 x 92mm
I/O	3 way lighted switch (all fans)
Other modes:	Remote- remote I/O via remote port/cable
Max fan airflow (cfm):	315
Weight (lbs):	6
Shipping container:	corrugated box/cut foam insert
Packaged weight (lbs)	11
Package Contents:	Heliport, accessory cradles(11), manual, power supply (boxed), remote I/O cable (1)
Container Dimensions(cm):	
L	101.5
W	29
H	27

BOX Scientific

Application Note

Box Scientific
www.boxscientific.com
408-361-8631