



Box Scientific Business Overview

January 2018



Background

- Box Scientific is a privately held company, founded in 2010 in San Jose, California. Box Scientific moved its operations to Charlotte, NC in 2013 where it resides currently.
- Derek Donohue, is the founder and president. He holds a BS in Chemical Physics and is a 10+ year veteran of the life sciences. He is also a successful inventor with multiple patents spanning a broad range of disciplines.
- Box Scientific was founded with the specific intent to develop efficient solutions for controlled, procedural thawing throughout the life sciences, as a means to improved quality and specimen and data integrity.
- Box Scientific products are distributed in 13 countries on three continents with hundreds of installations worldwide.



The Box Scientific Model

- Box Scientific products utilize the principles of convection to produce a sustained temperature gradient between samples and the ambient environment.
- This method facilitates safe and rapid thawing of samples without the input of external heat, and provides a highly reproducible end point
- By maintaining a steady thaw gradient this method also minimizes degradation from crystallization, pH and solubility shifts
- This simple concept, simply applied, yields a simple-to-use product with no calibration, maintenance or operational training required.
- Accessory components maximize capacity, capability, utility and versatility.
- Additional benefits include:
 - Enables proceduralization of thawing tasks
 - Reduces sample processing times and associated labor costs
 - Piggybacks on existing environmental controls
 - Holds thawed samples at equilibrium until use
 - Provides high reproducibility across replicates, laboratories and timescales



Station One

The original all-purpose thawing solution. By delivering a continuous stream ambient air Station One reduces sample thawing times by up to 75%. This action requires no external heat source, making it safe for even the most delicate specimens.



Convection thawing creates a natural gradient towards equilibrium with the working environment. Thawing to ambient equilibrium assures a highly reproducible endpoint that cannot be overshoot, will not drift over time and requires no calibration. This yields significant upsides for sample integrity, process control and data quality.

Accessory tube racks accommodate nearly every standard size consumable tube and microplate on the market. This affords users consistent results from sample to sample, test to test and laboratory to laboratory.





Heliport

Heliport brings the power of convection thawing to automated processes and large sample arrays. With a powerful convection system and an expanded thawing surface Heliport can accommodate hundreds or even thousands of samples in a single thaw.



With remotely controllable I/O and custom configurable SBS sample trays, Heliport allows easy integration with many liquid handling platforms, and easy matrixing for automated scripts.



Lightweight, easy to use, and drawing minimal power, Heliport is the ultimate thawing solution for any job big or small. It will provide highly reproducible results over long distances and timescales without the need for calibration or maintenance.



Heliport

**With Integrated
600W Heating
System**

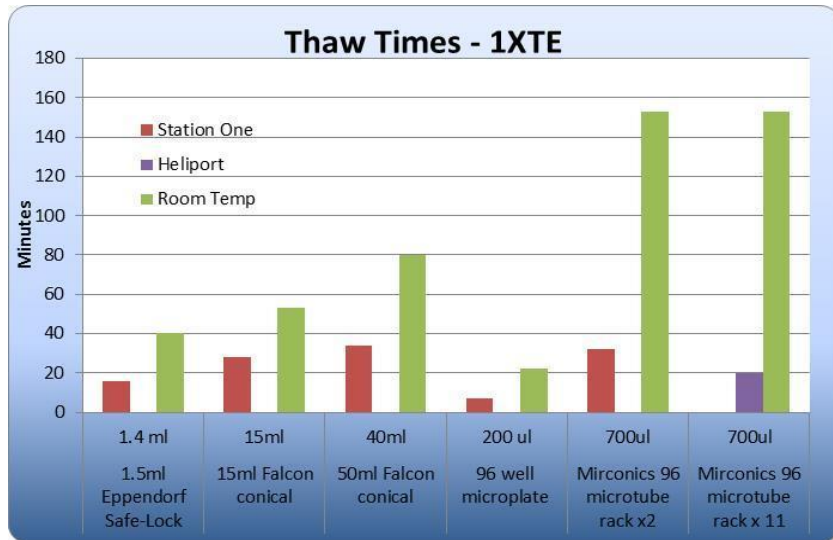


While Heliport's capabilities have left our customers wanting for nothing, large molecule compounds and high melt temp carriers like DMSO still suffered from long thaw times under ambient conditions. So we gave the Heliport an assist in the form of a 600W PTC heating system. This heating system combined with 7 upgraded fans running at 220V deliver six liters per minute of 30C air at a speed of two meters per second. The result is thawing speeds never before possible for this class of reagents. All made better by the uniformity and reproducibility that make BOX Scientific the new standard of the world.



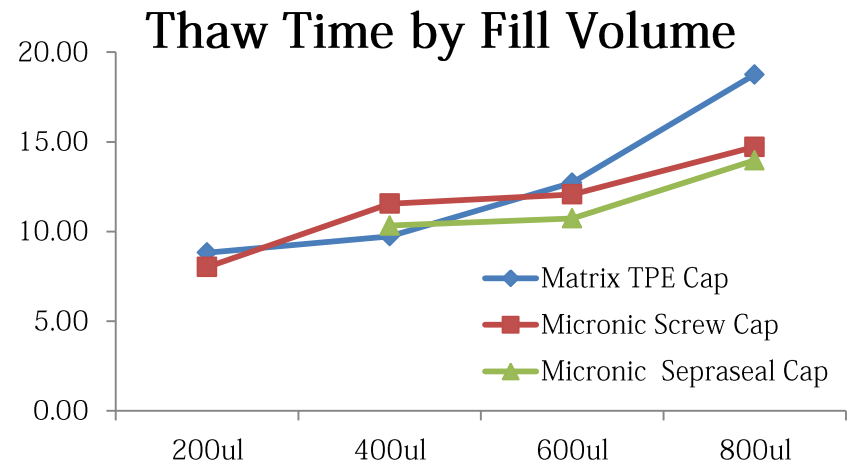


The Box Scientific Benefit: Speed



- Box Scientific Thaw Stations reduce thaw times by up to 75% for nearly any sample size or enclosure.
- Once at equilibrium samples remain in this state until ready for process input.
- Time saved translates to reduced labor costs, increased throughput and greater overall efficiency

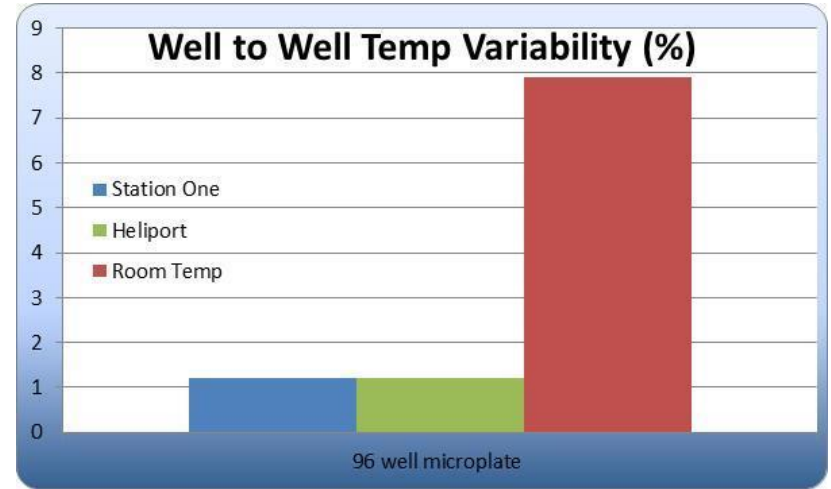
- A sustained thaw gradient eliminates the risk of degradation from pH and solubility shifts, or ice recrystallization
- This thaw gradient is highly reproducible across sample sets, laboratories and timescales, with no setup, calibration or tweaking of controls required.





The Box Scientific Benefit: Uniformity

- Because of the purely thermodynamic nature of this manner of thawing, results are highly uniform.
- Edge effects, hot/cold spots and well to well variation are minimized as the samples steadily exchange heat with the convection gradient
- Independent data illustrates a 7-fold decrease in well to well variability in a 96 well microplate, compared to benchtop thawing.



Data provided by University of North Carolina College of Genomic Medicine – June 2013

Station One - Small Tube Accessory
Time (min) to visually ice free

14	14	14				15	14	14
14	13						14	13
13			14		14			14
14			14		13			14
14	14						14	13
13	14	13				13	14	14

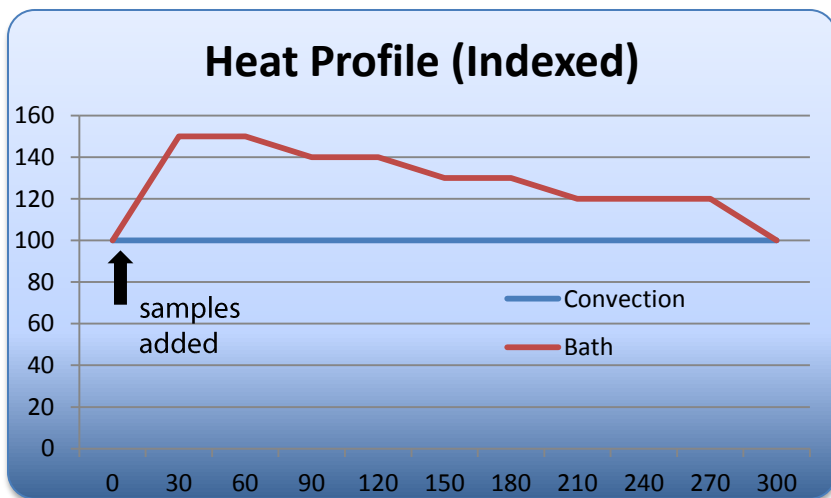
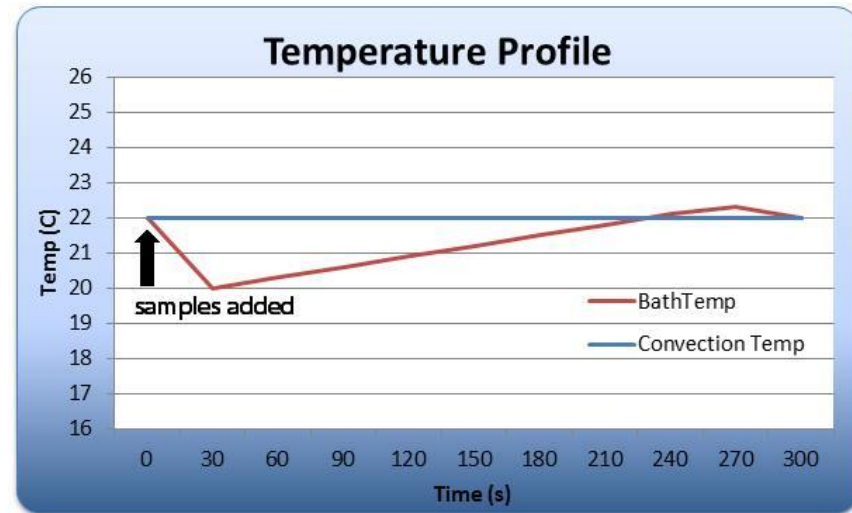
1.7ml Dolphin tube -1.0 ml water - Removed from -20C storage

Data provided by Genomic Health Inc. - May 2011

- The end result is highly uniform thawing within individual samples and across sample sets.
- Independent data shows an array of separate sample enclosures are all visually ice free within one minute of each other with no observable localized variation.

The Box Scientific Benefit: Thermal Stability

- Baths and circulators lose heat when samples are added, then must compensate by applying external heat to maintain set temperature. This heat input will vary from sample to sample and thaw to thaw.
- For this same reason these systems cannot provide a truly fixed endpoint.
- Ambient convection provides a fixed thermal gradient throughout the thaw.
- Furthermore, heat exchange ceases when samples reach equilibrium, assuring a consistent endpoint no matter how long samples remain on the unit.



- There is no net temperature effect on ambient conditions when samples are added.
- The result is the most thermally stable thaw, without EVER exposing samples to heat or temperatures higher than the desired target temperature.
- No other cold chain solution can provide this combination of benefits and ease of use.