A Flexible Solution for High Speed Sample Cherry-picking from Frozen Storage

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Abstract

To successfully automate sample storage and retrieval, compound samples must be quickly and reliably delivered to the location where they are required. The store must offer a protective environment for samples. Implementing the store should not cause a company major upheaval, and – especially important for smaller companies – the store must be able to grow with a company's business.

The comPOUND® modular sample store (TTP LabTech) is a flexible system that can be installed almost anywhere, due to its self-contained environment. This fully scaleable approach to storage also allows sample throughputs to increase with the library size to match process needs.

Introduction

Storage and delivery of compounds for pharmaceutical research is a complex and dynamic process. Any store must be configured to encompass variables such as sample integrity, size of compound library, storage vessels being used, and its physical location within the screening facility. Whist some storage technologies can meet such strict criteria, bespoke solutions may be inflexible as requirements change, in particular when facing marked increases in the number of samples.

TTP LabTech have responded by developing the comPOUND system, consisting of a modular storage unit and a suite of specialised delivery modules. This offers flexible storage capacity with high-speed cherry-picking to select library subsets. Sample integrity is maintained through storage at -20°C in an inert nitrogen atmosphere and tracking is assured using a 2D barcode on each microtube. This poster discusses the flexibility of the comPOUND sample store and how it can be configured to meet the varied demands of compound storage.

Conclusion

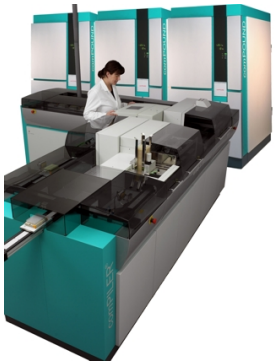
comPOUND®, comPANION™ and comPILER® provide an extremely modular and compact solution to the problem of safe sample storage, retrieval and processing. This compactness and modularity provide a high degree of flexibility, ensuring that your investment can adapt to suit changing process needs.

1 A modular system for easy growth

Each comPOUND module is a self-contained, sealed environment for storing and cherry-picking samples.

Modules are designed to be connected together in parallel to hold larger libraries, when required.

Up to 4 comPOUND modules may be linked to a comPANION remote delivery system. This allows the storage modules to be located up to 15m away from where the microtubes are delivered, in a different room – or even on a different floor.



comPILER connects up to 12 comPOUND modules to provide fully automated storage and cherry-picked plate creation with no operator intervention. Together, these give rapid access to a library of up to 1.2 million samples.

Such a system may be built up over time, as your sample library expands.

2 Safe storage for libraries

comPOUND is designed to provide a secure environment to maintain the integrity of collections of precious material. Each comPOUND module stores 100,000 or 200,000 samples under nitrogen in a sealed chamber refrigerated to -20°C; providing a dark, dry and inert environment.

comPILER maintains a similar level of proven sample care throughout the thawing, decapping and plate preparation, and also while recapping and returning to safe storage.

Each sample microtube carries an individual 2D barcode. comPOUND modules read each microtube barcode on the way into the store and on the way out, so it is impossible to obtain the wrong sample.

The location of each microtube is held in an inventory local to each module. The data is physically stored on dual mirrored RAID drives and a built-in Uninterruptible Power Supply maintains data integrity if there is a loss of electrical power.

3 Throughput increases with library size

Each comPOUND module can cherry-pick any stored microtube out of 100,000 in an average of 5 seconds, and deliver it to an SBS format rack at the front of the module.

The comPANION remote delivery system links up to 4 comPOUND modules in parallel, so tubes can be accessed from all connected modules at the same time. Thus system throughput actually increases as storage modules are added. With 4 comPOUND modules attached, comPANION can deliver over 10,000 tubes in an 8-hour day.

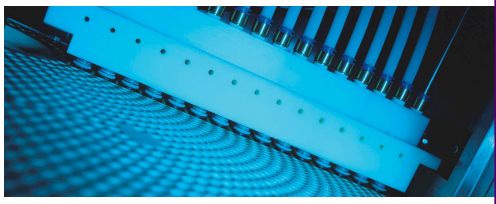
comPILER can cherry-pick from 12 comPOUND stores at the same time, maximising throughput. Parallel processing allows the system to retrieve, process and store over 20,000 microtubes in 8 hours.

4 Cherry-picking capability

When a comPOUND store retrieves a sample, it doesn't fetch and defrost an entire rack or plate. Instead, each individual microtube is cherry-picked, and racks of retrieved tubes can be arrayed in user-specified formats to simplify subsequent plate creation.

comPOUND achieves high density storage and high-speed retrieval by holding microtubes in concentric circles of holes in a moulded plastic carousel. Twenty six carousels are mounted on a shaft with a minimal gap between them. Retrieving a tube simply involves selecting the carousel with the target tube, and rotating it so that the tube is in line with delivery holes in the other carousels. Applying a burst of compressed air to the bottom of this temporary pipe lifts the tube to the turntable at top of the module.

This unique delivery system is high speed, and ensures the majority of moving parts are outside the temperature-controlled chamber for easy maintenance access.



5 Self-contained store can go anywhere

Both comPOUND and comPILER are self-contained and compact, so investment in special services or custom rooms can be avoided.

The modularity of the system also means that relocation is straightforward if your laboratory processes change. Relocation rather than reinvestment is a key saving for customers; down-time is typically only a few days, building work is kept to a minimum; and no expensive dismantling of the system is required.

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