{ APPLICATION NOTE }

Use of a Stand-Alone Labcyte Echo® with Titian's Mosaic Software

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Mosaic Sample Management is Titian Software's comprehensive, customisable, modular software product to control and monitor all aspects of sample storage, preparation and delivery. From small biotech to global pharma, Mosaic helps to provide a seamless, error-free sample supply chain and audit trail.

Mosaic Sample Management is a tailored solution for all sample management requirements, configured through expert consulting services.

Mosaic SampleBank and Mosaic FreezerManagement are Mosaic packages, optimised and pre-configured for rapid deployment:

- FreezerManagement keeps track of samples in freezers and provides a comprehensive audit trail as samples are accessed and aliquoted.
- SampleBank provides full inventory tracking capabilities coupled with sample ordering and workflow management in a simple package. It offers seamless start-up and ongoing performance for busy sample managers.

Mosaic's modular approach means that it is simple to upgrade or extend the software's functionality whenever it is needed.

Introduction

Acoustic transfer instrumentation has been at the forefront of liquid handling technology for the life sciences since 2004. The ability to reliably transfer nanolitre quantities of DMSO and aqueous solutions has enabled the scientific community to perform research on a scale not previously achievable at a practical level. This unique technology has been successfully applied by Labcyte to apply to a wide variety of scientific uses – from drug discovery to cancer research to genomics – and continues to expand as innovative techniques are developed in the industry.

These advantages can come with drawbacks; such as how to manage bringing the new instruments and the new information flows into your existing sample management system. Titian Software brings its extensive experience of integrating laboratory instrumentation and robotics into Mosaic sample management software to ensure that it is easy for customers to make best use of their investment in research and development technologies.

For many years, Labcyte and Titian have enjoyed a collaborative partnership which has facilitated the creation of robust solutions when integrating the Labcyte Echo instrumentation with Titian's Mosaic sample management software. As this relationship continues to grow, methodologies continue to be designed in tandem to produce a reliable, versatile and intuitive integration between our two platforms – making Mosaic the clear choice for nanolitre sample management.

The Labcyte Echo® Liquid Handler

The Labcyte Echo has transformed research by using sound energy to provide highly accurate, fully automated, non-contact dispensing of fluids. The Echo can transfer very low volumes of a variety of solutions from any acoustic compatible microplate well or AcoustiX tube, to any destination well. This greatly facilitates sample management processes. The Echo's flexible sample transfer capabilities range from simple reformatting operations, through creating dose-response curves for potency determination, to assembling complex assays – all while minimising reagent costs and sample waste.

The advantages of Echo's acoustic approach include:

- Non-contact, contamination free liquid transfers
- Fast, accurate and precise liquid transfers on a nanolitre scale
- Ability to transfer a wide variety of solutions (e.g. DMSO, aqueous buffers, etc.)
- Preserving sample integrity and viability during transfer
- No requirement for pipette tips
  - Reduces operating costs and waste
  - Eliminates time and effort associated with tip changing
  - Saves robotic work cell space (no tip boxes!)
- Sample sources can be acoustic friendly microplates or tubes

Integrating New Instrumentation into Sample Management

Sample management professionals face a number of challenges in the performance of their jobs. Bringing in new instrumentation can give them the physical tools that they need, but can also present issues with handling the new data streams that the new instruments provide.

Some of these issues can be:

- Managing and processing the multiple output files and file types created by various types of instrumentation
- Accessing and using the information contained in these files
- Relying on MicroSoft® Excel workbooks and macros to track samples and create reports
- Using internally developed, custom solutions, which can become outdated and inefficient as laboratory workflows change and instrumentation is improved
- Establishing IT support of bespoke systems without IT dedicated to smaller research lab applications
- Assuming that all sample preparation workflow steps are carried out as prescribed, without the ability to audit and investigate data anomalies
- Ensuring data integrity while managing multiple workflows involving multiple systems

To address these issues, sample management professionals need a proven partner for sample management who can provide a robust system to meet your sample preparation needs.

Combining the Power of Mosaic with your Labcyte Echo Acoustic Device

Titian's Mosaic software is the perfect solution for managing and tracking both large, complex and/or high throughput sample orders as well as smaller, more varied workflows. When the Echo has its software directly integrated with Mosaic, sample management groups can fulfil workflow steps best-suited to the acoustic platform in a user friendly and intuitive manner. The work is presented to you in Mosaic and requires only a handful of operator steps to carry out. This, followed by Mosaic's automated results processing, will complete the sample management workflow, accurately update your inventory and maintain traceability in a comprehensive audit trail

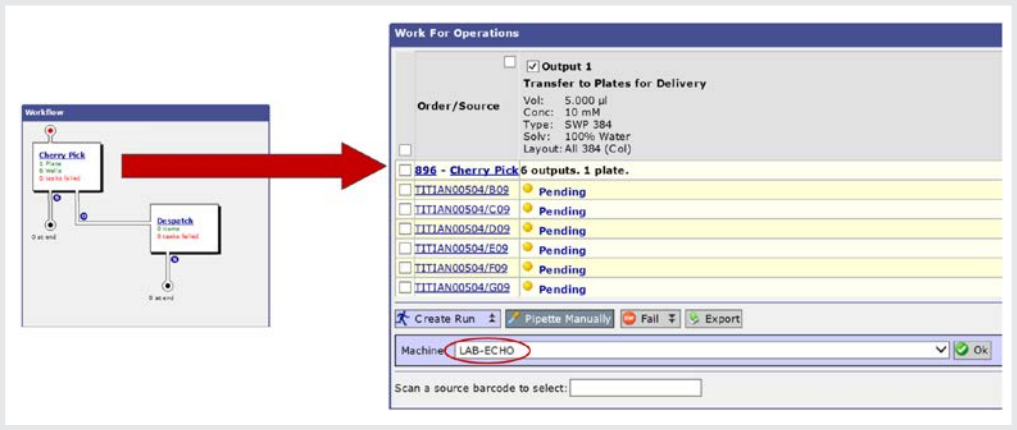
The key benefits to this integration are:

- Operator guidance in the fulfilment of sample requests and automated run creation
- Automated results processing. No manual file editing or copying steps!
- Capturing the exact volume transfers reported by the Echo in Mosaic inventory and in the audit trail
- Tracking all intermediate plates used by the Echo platform in Mosaic inventory and in the audit trail
- Survey volumes of source plate wells are used to update the Mosaic inventory
- Any Echo transfer failures are tracked and visibly highlighted in Mosaic inventory
    - Email reports are generated of any transfer errors during the automatic results file import
- Transfers of controls and standards, if present, are also reported and used to update the Mosaic inventory
- Mosaic also supports most Labcyte software applications for a stand-alone Echo: Echo Cherry Pick (ECP), Echo Reformat (EPR), Echo Dose-Response (EDR), and Echo Plate Audit (EPA)

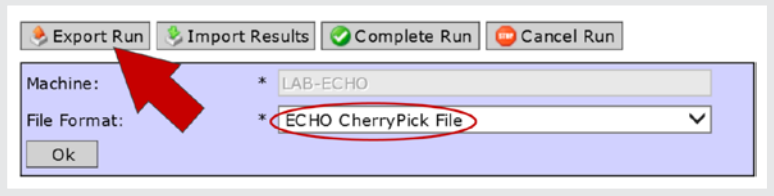
Performing Nanolitre Sample Request Fulfilment in Mosaic

The steps that an operator undertakes to fulfil an order workflow step on an Echo are as follows:

1) Select the desired order workflow step in Mosaic (e.g. Cherry Pick from a source plate)
2) Select the desired inputs and outputs to fulfil in the Mosaic Run
3) Choose a machine (e.g. the LAB-ECHO), and create the Run

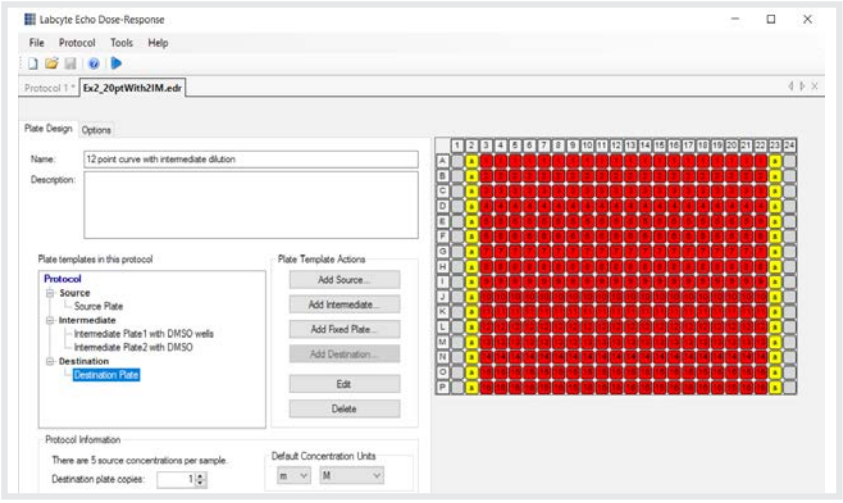


4) Once the Run is created, you can export a source picklist for the run

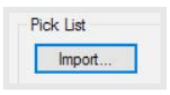


5) Switch to the Labcyte Echo application

a) Setup or open an Echo protocol within the relevant Labcyte Echo application (EDR, ECP, EPR, etc.)

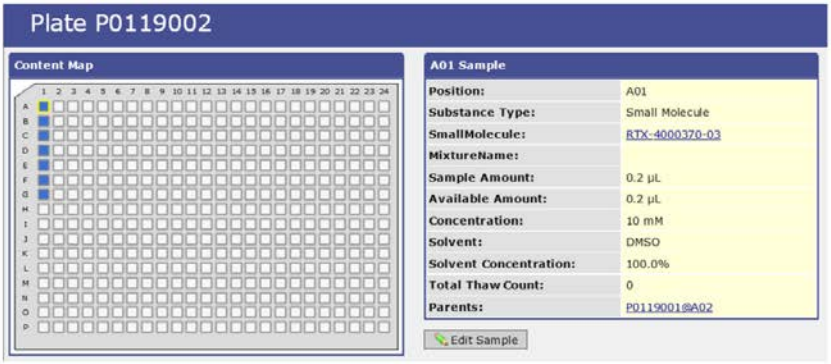


b Import the source picklist for the Run (from the location you saved it to in step 4)



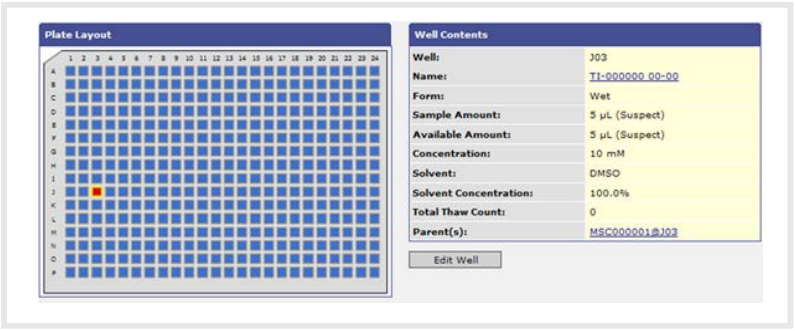
c) Start the Echo run

6. Once the Echo transfers are complete, newly created Echo XML report files will be converted into a report which is automatically uploaded by Mosaic. Source plate volume information is refreshed according to the Echo plate survey, and inventory data for the source and destination plates is updated as well.



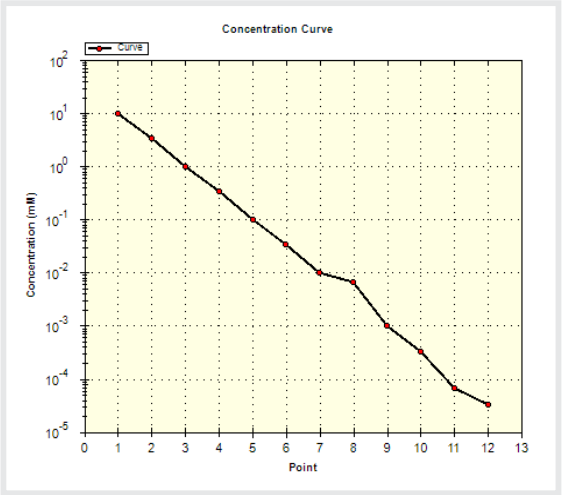
Error Tracking

Any Echo transfer errors caused by air bubbles, or other causes are highlighted as "Suspect" in the inventory and only affect the explicit well(s) and any subsequent doses dependent on them.



Echo Dose-Response Key Points:

- Mosaic registers and tracks the inventory of any intermediate plates involved in dose-response protocols
- Mosaic captures the material transfers exactly as they are physically performed, reflecting the discrete 2.5nL volumes that the Echo liquid handler can transfer. This results in an accurate plate inventory, both in terms of volumes and concentrations, as well as provision of a precise audit trail.



Summary

Using Titian's Mosaic sample management software with the Labcyte Echo allows for full integration of the sample preparation workflow with Labcyte's suite of Echo acoustic transfer software. Mosaic's tight coupling with the Echo and automated processing of the result files means that users are able to:

- Define and obtain the outputs they are looking for
- Maintain a highly accurate inventory by capturing the precise volume transfer and plate survey data provided by the Echo
- Track every sample preparation step via a comprehensive audit trail
- Capture liquid handling error information

About Mosaic

Mosaic sample management is Titian Software's comprehensive, customisable, modular software product to control and monitor all aspects of sample storage, preparation and delivery. From small biotech to global pharma, Mosaic helps to provide a seamless, error-free sample supply chain and audit trail. Mosaic sample management is a tailored solution for all sample management requirements, configured through expert consulting services. Mosaic's modular approach means that it is simple to upgrade or extend the software's functionality whenever it is needed.

Titian Software and Collaborations

Titian is the industry leader in providing sample management software for the Life Sciences. Using our Mosaic software, our customers see significant benefits in terms of throughput, response times, error rate reduction, sample conservation and cost savings due to markedly reducing the labour associated with managing sample collections. Titian Software's development efforts never stop as we continue to advance Mosaic toward higher levels of efficiency and practicality for the user.

The collaborative relationship between Titian and Labcyte continues to ensure that new applications are made available on a timely basis, and we pride ourselves on taking into account customer feedback for all Mosaic modules to drive our product to be the best it can be. It's all part of Titian's commitment to providing innovative solutions to make life easier for sample management professionals.

About the author

Arthur Yarwood

Fascinated by mathematics and programming, Arthur spent 11 years at Sony, specialising in tools programming, asset management and databases. He joined Titian in 2012 and is now a team leader and project manager on Mosaic.

Mark Doring

Mark Doring worked for Schering Plough for 25 years as a biochemist in new lead discovery, focusing on high throughput screening assay performance, development and compound preparation with an emphasis on automation and informatics. He joined Titian Software in 2015 as a business application consultant.

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