

The logo for Titian, featuring the word "titian" in a lowercase, sans-serif font, enclosed within a white, teardrop-shaped graphic element that tapers to the right.

titian

{ APPLICATION NOTE }

Using The Labcyte Echo[®] Liquid Handler and Access[™] with Mosaic Sample Management Software

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VERSION: 1.0. JANUARY 2017



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

Since 2004, acoustic transfer instrumentation has been at the forefront of liquid handling technology for the Life Sciences. 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 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.

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 rates, labour costs and in the sample conservation performance of their sample banks. We also use our experience of integrating laboratory instrumentation and robotics into our systems to ensure that our clients 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 system can transfer a variety of solutions from any microplate well to any destination well at low volumes, greatly facilitating sample management processes. The flexible sample transfer capabilities range from simple reformatting operations, to creation of dose-response curves for potency determination, to assembly of complex assays, all while minimising reagent costs and sample waste.

The Echo Acoustic Advantage:

- Non-contact, contamination free liquid transfers
- Fast, accurate and precise liquid transfers on a nanolitre scale
- Able to transfer a wide variety of solutions (e.g. DMSO, aqueous buffers, etc.)
- Preserves sample integrity and viability during transfer
- No pipette tip requirements
 - Reduces operating costs and waste
 - Eliminates time and effort associated with tip changing
 - Saves robotic work cell space (no tip boxes!)

When using your Echo at the heart of an Access[™] or POD[™] robotic solution:

- All plate handling operations are automatically done for you. Labcyte's Tempo[™] software coordinates diluent additions, plate sealing, and storage.
- Operators are freed up to "walk away" and perform other essential tasks while the automated system creates your plates to your specification

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:

- The ability to manage and process multiple output files and file types created by various types of instrumentation
- The consumption of the information contained in these files
- Reliance on MS Excel workbooks and macros to track samples and create reports
- The use of internally developed, custom solutions that 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
- Making the assumption that all sample preparation workflow steps are carried out as prescribed without the ability to audit and investigate data anomalies
- Managing multiple workflows involving multiple systems with confidence while insuring data integrity

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 Access Integration

Mosaic 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 (or the Access or Pod workcell) 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 is fulfilled on your system through completion of only a handful of operator steps. This, followed by Mosaic's completely automated results processing, will complete the sample management workflow, accurately update your inventory and maintain traceability in a comprehensive audit trail.

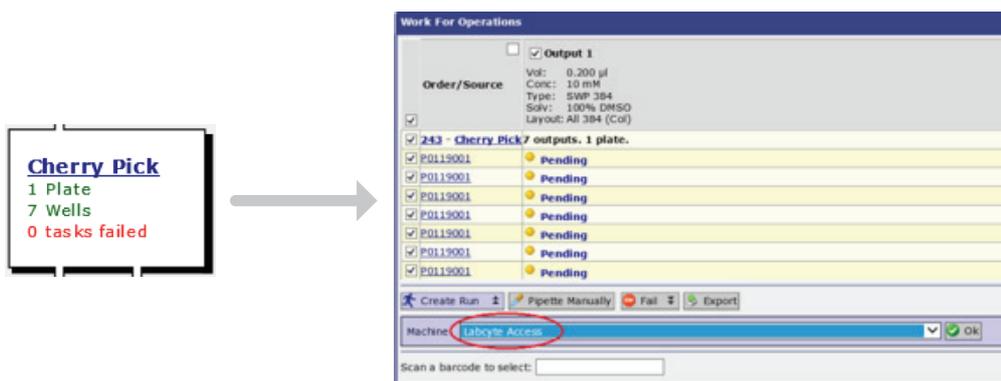
The key benefits to this integration are:

- Operator guidance in the fulfilment of sample requests and automated run creation
- Automated results processing. No manual file editing or copying steps!
- The exact volume transfers reported by the Echo are captured in Mosaic inventory and in the audit trail
- All intermediate plates used by the Echo platform are also tracked 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

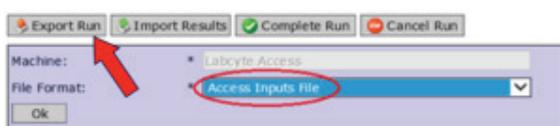
Performing Nanolitre Sample Request Fulfilment in Mosaic

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

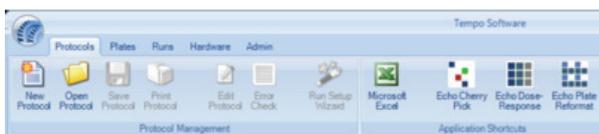
- 1) Select the desired order workflow step in Mosaic (e.g. Cherry Pick from a source plate)
- 2) Select the desired inputs and outputs to fulfil in the Mosaic Run
- 3) Choose a workcell (e.g. the Labcyte Access), and create the Run



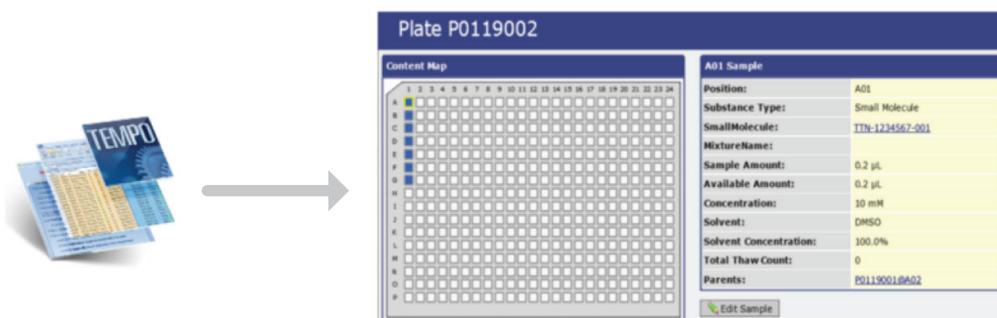
- 4) Once the Run is created, you can Export a Tempo source picklist for the run



- 5) Switch to Labcyte Tempo application
 - a) Setup/Open a Tempo Run Definition with associated Echo protocol
 - b) Import the source picklist for the Run
 - c) Start the Tempo run

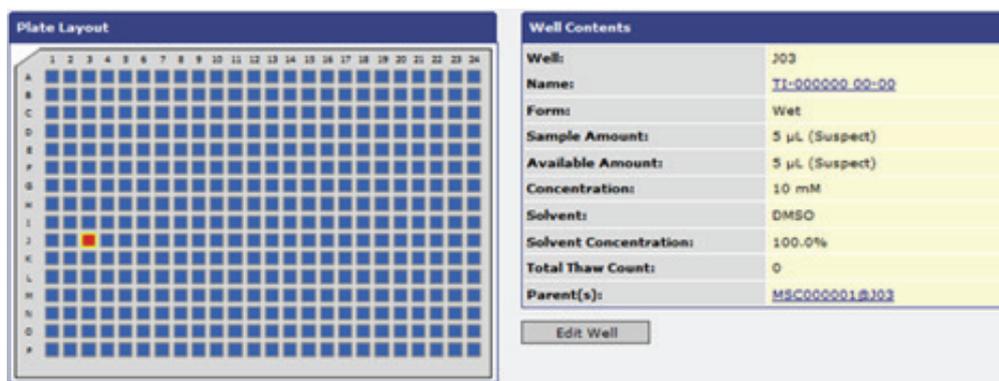


- 6) Once the Access run is complete, the Tempo results will be automatically processed by Mosaic. This includes the updating of source plate volume information obtained via the Echo plate survey as well as the update of inventory data for source and destination plates.



Echo Dose Response Example:

- Mosaic registers and tracks the inventory of any intermediate plates involved in serialisation protocols
- Mosaic captures the material transfers exactly as they are physically performed, reflecting the discrete 2.5nL volumes that the Echo instruments 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.
- Any Echo transfer errors caused by air bubbles, or other causes are highlighted in the inventory and only affect the explicit well(s) and any subsequent doses dependent on them.



The screenshot displays the Mosaic software interface. On the left, the 'Plate Layout' window shows a 96-well plate grid with columns 1-24 and rows A-P. Well J03 is highlighted in red. On the right, the 'Well Contents' window provides detailed information for well J03:

Well Contents	
Well:	J03
Name:	TI-000000_00-00
Form:	Wet
Sample Amount:	5 µL (Suspect)
Available Amount:	5 µL (Suspect)
Concentration:	10 mM
Solvent:	DMSO
Solvent Concentration:	100.0%
Total Thaw Count:	0
Parent(s):	MSC000001#J03

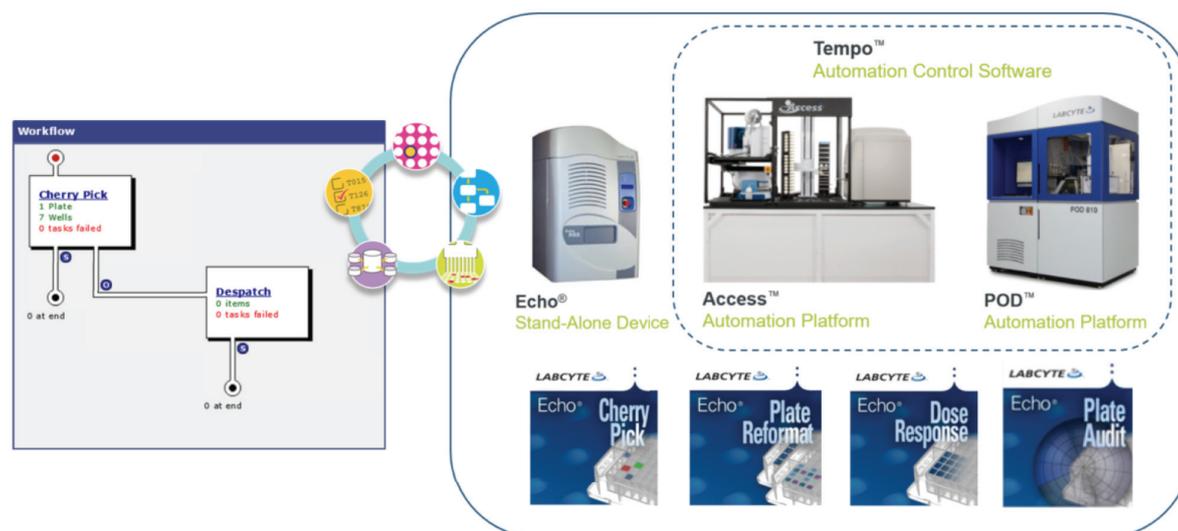
Below the table is an 'Edit Well' button.

Summary

The use of Mosaic Sample Management software along with the Labcyte Access allows for full integration of the sample preparation workflow with Labcyte's suite of Echo applications software.

Mosaic's tight coupling with these systems 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



Titian'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 our 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.



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