A large, semi-transparent image of a laboratory instrument, likely a pipette or a tube handler, is shown in the background. It features a multi-well plate with numerous small, clear tubes arranged in a grid. The instrument is light-colored, possibly white or light grey, and is set against a light blue background.

# Enhance your Tube Handling with Titian's Mosaic Tube Position Verifier (TPV) Application

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v2.1

## INTRODUCTION

Sample management workflows are not only about transferring samples from one piece of labware to another. The sample containers also move from place to place and are easy to track because they are convenient to barcode. So labware locations need to be logged and updated in your inventory to ensure a smooth workflow and an accurate audit trail.

There are also times when it is useful to compare the physical positions of sample tubes within a rack to the locations stored in your inventory database. This comparison allows scientists to effortlessly and quickly confirm tube positions after a rack has been dropped, or when partially filled racks need to be consolidated to use freezer space more efficiently.

## BENEFITS OF USING A RACK READER

Sample tube rack readers, or rack scanners, are usually 2D barcode readers that can read an entire rack of tubes at a time. They form the backbone of many sample storage and tracking systems as they provide fast identification of 2D coded and racked tubes without the need to scan the tube barcodes individually.

Additional benefits often include:

- simultaneous reading of rack linear 1D barcodes, for easy robotic integration
- ability to read barcodes from cold environments
- ability to read any 2D barcoded tube, not limited to one manufacturer
- compact and easy to position anywhere

## BENEFITS OF INTEGRATING RACK READERS WITH YOUR SAMPLE MANAGEMENT SOFTWARE

Integrating tube rack readers with your sample management software makes it easy to trace the movement of samples through the sample management workflow, as data from



rack readers can be passed automatically to your inventory. This also enables the rapid comparison of the physical positions of sample tubes in a rack, to the data stored within your inventory database. This can assist you to recover after a rack has been dropped and can help you rapidly consolidate partially filled racks.

Titian Software's Mosaic sample management software offers a Tube Position Verifier (TPV) application as part of Mosaic's overall product suite. The TPV application integrates with a variety of rack readers on the market.

This document describes a few practical use cases that make the TPV application an essential part of your Mosaic configuration.

## COMPATIBLE DEVICES

Mosaic's TPV application is compatible with a wide array of market-leading tube rack readers including:

- AltemisLab AlteRead™ series
- Brooks Life Sciences Perception™ series
- Micronic DR series
- Omron Microscan
- SPT Labtech SampleScan™ series
- Thermo Scientific VisionMate™ series
- Ziath DataPac™ series



## SUPPORTED OPERATIONS

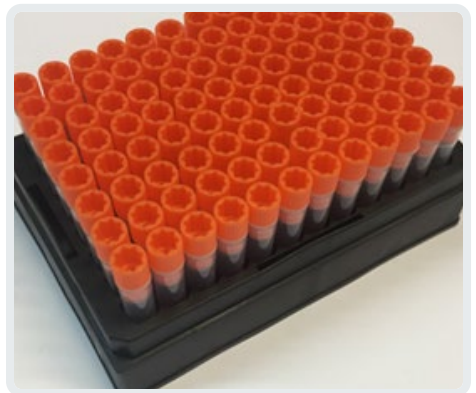
Mosaic's TPV application integrates tightly with rack readers to support a range of essential tasks that form part of the overall sample management process:

- Verifying rack contents
- Tube consolidation within racks
- Picking/Placing tubes from and to manual storage
- Registering new tubes/racks
- Identifying sample tubes for a Mosaic Order

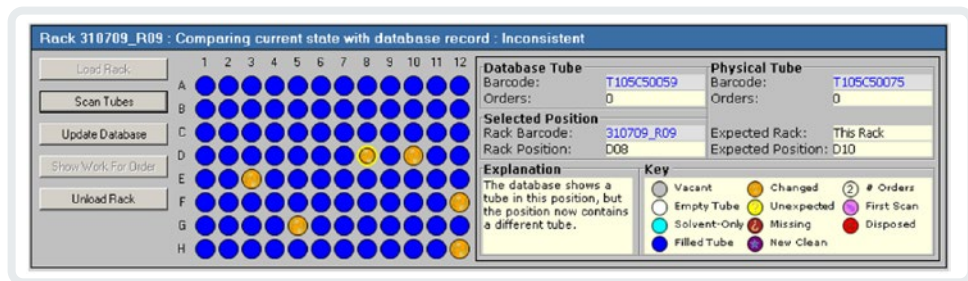
## USE CASE 1: VERIFYING RACK CONTENTS

When racks of tubes are registered in Mosaic, Mosaic records the details of the rack and sample tubes as well as the positional information of all the tubes within the rack. However, if the rack was accidentally knocked off the bench or it fell over within the freezer, it is a near impossible task for a user to put all tubes that had fallen out back into the correct positions matching their inventory locations.

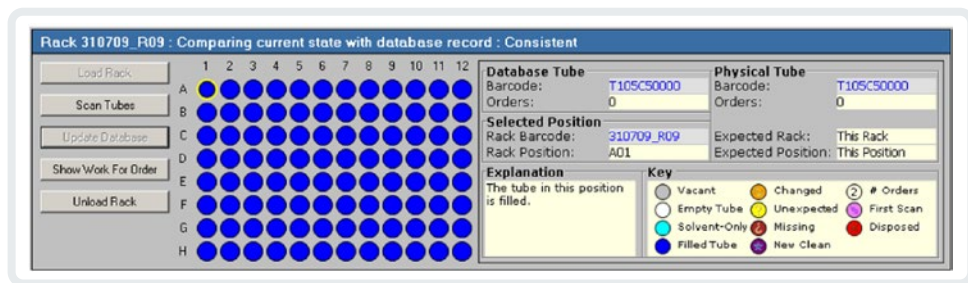
Mosaic's TPV application makes it easy to verify and update rack contents, for example: to recover after a rack has been dropped.



Loose tubes can be returned to the rack in any position. The rack barcode is checked to call up the information Mosaic has stored on that rack. The user selects “Scan Tubes” and the rack reader scans all the tube barcodes and passes the data to Mosaic. Any discrepancies are highlighted in the Mosaic interface – these are the tubes that fell out and were put back:



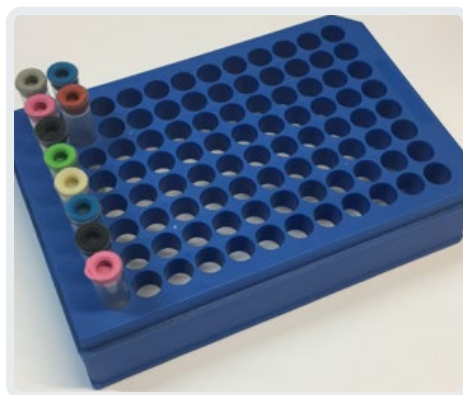
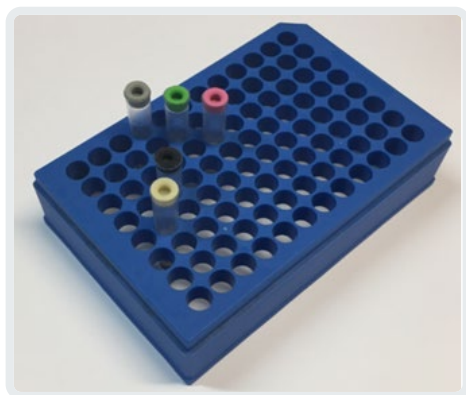
The user then simply clicks the “Update Database” button to update Mosaic’s database with the new positions of these tubes. The rack map refreshes to show that the database is now consistent with the data from the scan.



## USE CASE 2: RACK/TUBE CONSOLIDATION

A common lab scenario is to re-arrange and consolidate tubes from two or more partially filled racks into a single rack for more efficient storage and processing.

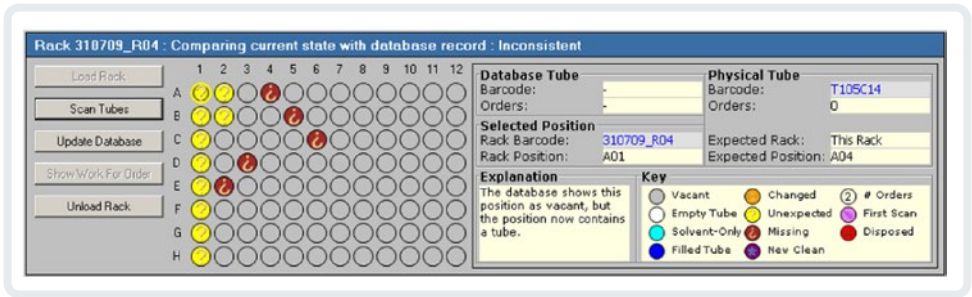
Mosaic's TPV application makes it easy to rearrange racks and update the inventory without having to scan and update the database entry for each tube.



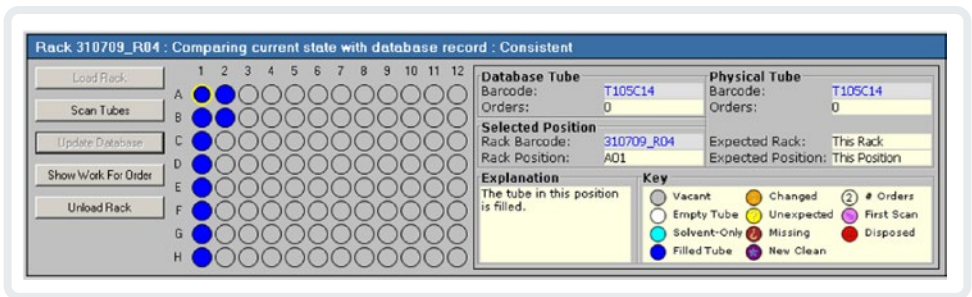
Tubes can be placed in the rack in any position. The rack barcode is checked to call up the information Mosaic has stored on that rack. The user selects "Scan Tubes" and the rack reader scans all the tube barcodes and passes the data to Mosaic. Any discrepancies are highlighted in the Mosaic interface:

- The red icons are where Mosaic expects there to be tubes (however these are now in column 1)
- The yellow icons are tubes that are not expected to be in those positions (here, the first five are the ones moved and the remaining ones (F1-B2) were added from a different rack)





The user then clicks the “Update Database” button to update Mosaic’s database with the new positions of these tubes and the rack map refreshes to show that the database is now consistent with the data from the scan.



Using Mosaic’s TPV application makes the consolidation process extremely quick, which means samples are only out of storage for a short space of time, thus minimising sample degradation.

## USE CASE 3: UPDATING RACKS AND TUBE LOCATIONS TO AND FROM STORAGE

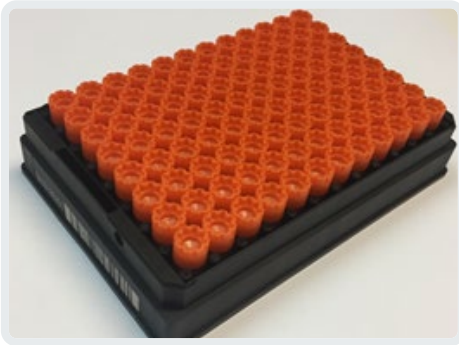
Manual freezers are used in most labs, but their drawback is that items can be removed without updating your inventory, especially if the updating process is time consuming. Mosaic’s TPV application integrates easily with rack readers to make the process as simple as placing the rack on the reader to have its location automatically updated in the Mosaic database.

Alternatively, individual tubes can be cherry picked from the store can be placed into a new rack, which is then scanned to update the tube locations.



## USE CASE 4: REGISTERING NEW TUBES/RACKS

Often a laboratory wants to register racks of empty tubes in its inventory, so these can be stored ready for use in future sample preparation workflows. Mosaic's TPV application guides new racks.



**Question**

There is no rack with barcode '01'. Would you like to create a new rack?

If so, please select the rack type and click 'Yes'.

HR Tube Rack	▲	Yes
Matrix rack 0.5 ml	■	
Matrix rack 1.4 ml	■	
Mini Tube Rack	▼	No

If the rack is not registered in Mosaic's inventory, the user is asked to select the rack type and scan the rack.

The scanner reads the 2D codes on the base of the tubes and the TPV application checks whether these tubes are known to Mosaic. If not, the user simply clicks "Update Database" to create these clean empty tubes in Mosaic's database.

**Rack Barcode01 : Comparing current state with database record : Inconsistent**

Load Rack	1	2	3	4	5	6	7	8	9	10	11	12
Scan Tubes	A	[Grid of 12x12 tubes]										
Update Database	B	[Grid of 12x12 tubes]										
Show Work For Order	C	[Grid of 12x12 tubes]										
Unload Rack	D	[Grid of 12x12 tubes]										
	E	[Grid of 12x12 tubes]										
	F	[Grid of 12x12 tubes]										
	G	[Grid of 12x12 tubes]										
H	[Grid of 12x12 tubes]											

**Database Tube**  
Barcode: \_\_\_\_\_  
Orders: \_\_\_\_\_

**Physical Tube**  
Barcode: 0001  
Orders: New tube

**Selected Position**  
Rack Barcode: Barcode01  
Rack Position: A01

**Expected Rack:** New tube  
**Expected Position:** New tube

**Explanation**  
This position contains a new clean tube.

**Key**

○ Vacant	● Changed	② # Orders
○ Empty Tube	● Unexpected	① First Scan
● Solvent-Only	● Missing	● Disposed
● Filled Tube	● New Clean	

**Question**

This action will create tubes in the Inventory database. Are you sure?

If so, please select the appropriate tube type and click 'Yes'.

2D Mini Tube (1.4 ml)	Yes
	No





## SUMMARY

Titian Software's TPV application integrates a variety of rack scanners to help you to easily and efficiently record or update locations of tubes as they move through your sample management workflows.

The TPV application enables users to easily:

- Register new tubes/racks
- Quickly consolidate sparsely populated racks
- Easily recover after dropping a rack
- Log items in and out of a manual store

By bringing rack readers into the Mosaic interface, scientists and sample management operators can continue to use one familiar interface to request samples and update their locations. Tube and rack locations are automatically updated in real time and a full audit trail is logged for every sample movement.

An additional benefit is that Titian works in partnership with rack reader vendors to continually evolve the TPV application, so it is responsive to customer requirements and the development of new reader types and software.

## ABOUT TITIAN SOFTWARE

Titian Software is the industry leader in providing sample management software for 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. 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.



At Titian Software, our development efforts never stop as we continue to advance Mosaic sample management software toward higher levels of efficiency and practicality for the user. The ongoing collaborative relationship between Titian and hardware vendors continues to ensure that new applications are made available on a timely basis to fulfill our customer's research goals. We pride ourselves on taking into account customer feedback for all of our Mosaic applications to drive our product to be the best it can be. It's all part of Titian's commitment to providing innovative solutions that make life easier for sample management professionals.

#### **AUTHOR**

#### **TIM STROUD:**

After 15 years as a scientist at Pfizer, Tim Stroud moved to MedImmune for 3 years to specialise in managing laboratory automation. He joined Titian Software in 2014 as a business application consultant.

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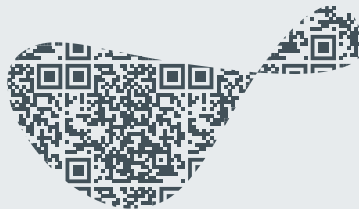


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