



T T P L A B T E C H



Lab2Lab

Intelligent, local-area sample management and analysis

Lab2Lab is a configurable and flexible, site-wide microtube transportation system. It associates a list of tasks/methods to be performed on a sample and then pneumatically transports the sample microtube between the relevant laboratory, analytical device, rack assembly or storage system to ensure completion of the task. Data associated with each task allows simple automated integration with your current IT set up.

Analytical Chemistry

Lab2Lab automatically routes each sample microtube to the analytical instrument best able to deal with it. Scientists submit microtubes, specifying what analyses they require. Lab2Lab takes care of the rest. Microtubes are directed to whichever analytical device on your site can analyse them at that moment in time, pneumatically transported from the lab to anywhere else in the building, or even to a neighbouring building. Lab2Lab identifies which piece of lab equipment (HPLC, GCMS, NMR etc) is best able to deal with the microtube, sends it there and automatically analyses it. Additional parameters (e.g. ELN reference or user ID) can be passed to the device ensuring that the resulting data is correctly identified. If the required instrument is unavailable, the microtube is automatically held in a buffer until it becomes free.

Lab2Lab allows analytical instruments to be clustered in one area. This maximizes up-time, reduces maintenance costs and makes managing the instrumentation easier.

The Lab2Lab software provides a user-friendly way to manage microtubes. All microtubes are identified by their unique 2-D barcodes. Each microtube's barcode is read every time it passes through the central Router. A scientist will submit data via Lab2Lab's locally deployed VialData software. This can be installed on any PC on your LAN. The VialData software also allows scientists to view the location and status of their samples. More than one analytical process can be specified for each microtube. Only details of the ID and the methods to run are recorded, so electronic data remains secure.

Lab2Lab provides:

- Optimisation of expensive analytical instrumentation
- Maximisation of analytical instrumentation usage – the system can run 24/7
- User friendly software which is simple to integrate
- Fast, on-demand supply of sample microtubes to any location within your facility
- Flexibility with the ability to expand the system when necessary
- An adaptable solution that is easy to install
- A customisable system to fulfil your specific requirements

Key elements of the system

In its simplest configuration, Lab2Lab comprises a microtube Sender, Router, Buffer, Receiver and the flexible delivery tubing which connects the system components together. Lab2Lab is easy to expand as each Router can connect up to 30 Senders/Receivers and multiple Routers can be used per system. Future expansion allows the user to connect Bulk Senders allowing racks of microtubes to be sent automatically.

Microtube Sender:

The microtube Sender can be sited in any laboratory. When a sample is ready for analysis, the scientist scans the microtubes barcode and enters details on their PC. The microtube is then sent pneumatically to the Router. If a scientist wishes to submit multiple samples for analysis, rather than submit them individually from a Sender, they can use a Bulk Sender. This can take up to 96 microtubes from a standard SBS rack.

Router:

The Router manages the flow of sample microtubes. When each sample is received, its barcode is read, and it is either transferred to an available analytical instrument, to the buffer unit, or to a manual collection point or waste if no further sample analysis is required. Each Router can connect up to 30 Senders/Receivers.

Buffer:

The Buffer can hold up to 96 microtubes. It is used to temporarily store samples that have been submitted whilst they wait for an analyser to be available. The Buffer can easily be connected to an integrated rack handling robots such as a Hamilton SWAP or Twister II.

Receiver unit:

The Receiver transfers the microtube directly to the auto-sampler of an analytical instrument (such as a Waters Acquity or Agilent 1100/1200). Once the sample has been processed, the results are sent to the network and the microtube returned to the Router. Currently Lab2Lab is designed to use Agilent and Waters instruments, but any device capable of automated control could be easily integrated (such as NMR).

Transport:

Lab2Lab has been developed using the same pneumatic technology that has been successfully used in its comPOUND® and comPILER® sample storage systems for many years, providing a reliable, secure and rapid means of transporting samples around research facilities. The transport pipes can be run within the superstructure of a building or on the surface of walls and ceilings (as required by the end user). There is no theoretical limit to transport distances. A single 6bar compressed air supply can easily transport tubes up to 1000m. Longer distances are achieved using boosters.

Microtubes:

Lab2Lab is designed to transport microtubes. At present the system has been optimised for 500uL Matrix TrakMate microtubes (<http://www.matrixtechcorp.com/storage-systems/solutions.aspx?id=14>). However, simple exchange components in devices will allow a variety of microtube types to be used. It is even possible to send glass microtubes.

Benefits of Lab2Lab include:

- more efficient instrument utilisation
- increased speed of data generation
- Increased usage of analytical equipment (overnight running)

- simple to install in existing laboratories
- easy to expand the system as required
- easy to customise to customers requirements

Compound QC

As compound libraries grow the need to be confident about the quality of the stored samples becomes ever more important. With automated screening systems the scientist often has no opportunity to check the compounds as they are used for the creation of assay plates. The first they know about a problem is unexpected screening results.

Often chemical compound libraries are solubilised in DMSO and then frozen to -20°C or lower. This in itself can cause a variety of issues due to DMSO's aggressive hydrophilic characteristics including:

- Precipitation – the solubility decreases as water content increases and often increases with freeze / thaw cycles. Compounds are more likely to fall out of solution due to hydrate formation.
- Crystallisation – again repeated freeze / thaw cycles generating slow cooling effects can increase the likelihood of crystallisation of amorphous material in the low temperature making re-solubilisation much harder.
- Depression of freezing point – The DMSO will freeze at much lower temperatures once it is saturated with compounds (e.g. 10% will reduce freezing point from 18°C to <4°C). As a result degradation can occur due to the possibility of unintentional reactions
- Concentration – reducing concentration levels to 2-5mM from the more usual 10-30mM can reduce precipitation but this limits the test concentrations used in assays particularly those that cannot tolerate high concentrations of DMSO in the assay buffer (e.g. some cell and enzyme based assays).
- Decomposition - compounds can degrade due to effects of temperature, light (e.g. UV in organic compounds), pressure and age

Refrigeration systems can also cause problems themselves such as sublimation of the sample through porous seals or bungs in the tubes in a dry atmosphere. Knowing the quality and state of the stored compounds is therefore of vital importance. With the Lab2Lab system your compound collection can be sent to HPLC or GCMS and analysed overnight without affecting the normal running of the compound library. Problematic compounds can then be discovered and withdrawn from use. Levels of confidence can be gained from returned analytical data and estimated lifetimes could be assigned to compounds.

The Lab2Lab system will seamlessly integrate directly with the TTPLabTech comPOUND system using the additional transport ports available in the comPOUND. Other compound storage system can easily be integrated or the system can be used in a semi-automatic mode where racks of tubes are sent fed to the Bulk Senders.

Assay Plate Creation

Lab2Lab can be used to create tube racks ready for direct liquid transfer into assay ready microtitre plates. Scientists can submit samples at will assigning the assay set that they want them to be part of. Once the assay set has been assembled the Lab2Lab system can then transfer the rack to a liquid handler with a data file describing to location of each sample within the rack where an aliquot can be removed to create the plate. Once the plate has been assayed any unusual results can be traced back to particular compound samples. The Lab2Lab system can then automatically take the tubes of interest and have them sent to the analytical instruments for follow up analysis and confirmation.

To arrange for a demonstration of Lab2Lab at TTP LabTech's HQ in the UK please contact: sales@ttplabtech.com or SampleManagement@ttplabtech.com or call +44 1762 262626.