



B8 Self-Generating Robot Worklists and Complete Sample Traceability Through Laboratory Information Management Systems (LIMS) Integration and Barcodes

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After attending this presentation, attendees will be familiar with a customized robotic liquid handling system which is capable of self-generating worklists through the use of barcodes and LIMS integration.

This presentation will impact the forensic science community by informing forensic DNA laboratories about an automated system which has integrated the LIMS database and utilizes barcodes to improve sample traceability and reduce analyst input errors.

The Texas Department of Public Safety (TX DPS) Crime Laboratory in Houston, TX, recently procured a Hamilton AutoLys STARplus for the purpose of automating the entire DNA workflow, including lysis and substrate removal, on a single platform. Sample traceability is of utmost importance to the TX DPS Crime Laboratory system; therefore, the use of barcodes and LIMS integration was essential to this project. The instrument was integrated with the DPS LIMS database which enabled self-generating worklists with built-in data verifications and complete sample traceability through the use of 2D barcodes.

The STARplus system was modified by Hamilton to accommodate both 2D and 1D barcode reading systems. The 2D barcode on the bottom of the AutoLys tube is registered in the LIMS system to a specific item of evidence while another 2D barcode is generated for the label on the 1.5mL tube that will be used for the final storage of the purified DNA extract. Both barcodes are associated with the same sample, so the sample's movements are recorded in its chain of custody as it makes its way through the DNA process. To work around limitations of the current LIMS system, samples are batched together using a barcoded mobile container.

Through the use of barcodes, data verification measures, and custom programming by the Hamilton Automation Applications engineer, the instrument has the ability to ensure the proper number of reagent blanks, distinguish "known" and "questioned" samples to prevent co-extraction, determine the length of the lysis buffer incubation and elution volume during extraction based on sample type, verify user input for extraction kit information, and create self-generating worklists. These measures reduce both the amount of input needed from the analyst and the potential for transcription errors.

In order to store and access quantification results, a custom-built quant value database was developed by Hamilton for TX DPS Houston. When the robot creates a worklist for the normalization/amplification method, it queries the LIMS database for sample information, and queries the quant value database for quant values. The method then combines the data to generate a worklist.

Finally, TX DPS Houston has developed a separate spreadsheet workbook for each method that uses output files generated by the robot to create casefile worksheets. All sample information is imported into the spreadsheet workbook, requiring the analyst to input only the occasional date and run identifier. The worksheets also offer extra functionality including highlighting samples from a specific case, printing, and selecting capillary electrophoresis instruments and injection times.

Overall, the Hamilton AutoLys STARplus has met expectations and has proven to be reliable in terms of ease of use for workflow and sample traceability.

Automated DNA Workflow, Barcode Traceability, LIMS