RRUSH™

- Rapid
- Response
- Universal
- Specimen
- Handling

Rapid Response Universal Specimen Handling

LAB-Interlink Canada Inc. (amalgamated with LABOTIX™ Automation Inc.) is a North American Corporation which manufactures automation technology for the clinical laboratory market. LAB-InterLink technology provides solutions to automate labor intensive, tedious and often hazardous laboratory sample and specimen preparation procedures.

LAB-InterLink has developed automated solutions for some of North America's leading clinical reference laboratories. Following research and development in the large clinical reference laboratory market, LAB-InterLink has configured pre and post analytical specimen tube automation technology into flexible modules which meet the needs of clinical laboratories of all sizes.

The **RRUSH™** system is a configuration of automated modules interconnected through an transport system which is capable of rapid and efficient processing of specimens throughout the clinical laboratory. The systems purpose is to transport and automatically sort specimen tubes while delivering them to appropriate analysis or storage areas ready for processing.

The basic components of the **RRUSH™** system include a Process Manager computer, a Loading Station, LAB-InterLink Specimen Carrier, a Transport Conveyor, a variety of gating devices, Tube Uncappers and Recappers, and Specimen Managers for various functions.

The Process Manager, which is a pentium computer operating in a Windows or Windows NT environment, is the "nerve center" of the Laboratory Automation System. The Process Manager is responsible for the overall operation of the automation system, coordinating communication and function between all workcells on the system and the Laboratory Information System. The Process Manager creates and maintains a database on each specimen tube using information downloaded from the Laboratory Information System. By way of the ethernet network, the Process Manager uses the database to control each specimens routing throughout the Laboratory Automation System and to provide specimen processing instructions to the various workcells.

While the system interfaces with the laboratory information system (L.I.S.) it is by way of a "gentle handshake"; the L.I.S. interacts with the **RRUSH™** system as if it were simply another analyzer. The **RRUSH™** system requires only to view basic patient demographic and test ordering data from the L.I.S.. It does not interfere with or in any way control the interface between the L.I.S and any analytical equipment.

The specimen first meets the Laboratory Automation System (LAS) at the loading station. It is here that the Process Manager interface monitor and keyboard are located. It is from here that the "Operator" can bring the LAS on line, shut it down or monitor its functioning. It is also at this location where laboratory staff place specimen tubes into the unique LAB-InterLink Specimen Carrier. One operator can typically transfer in excess of 1000 specimens per hour onto the line. Specimens can be placed rapidly into "tri-pronged" Specimen Carriers for release onto the LAS. The Specimen Carriers, relying on a spring pressure design, are capable of secure, upright transport of the specimen around the LAS. (The system is designed to handle all common tube sizes in general use; tube range is 10mm-20mm diameter, and 50mm-140mm height, including the cap.) They are also designed to be easily and rapidly reoriented or manipulated by the various gates, diverters, singulators and orienters along the transport system. Once released from the loading area the specimen tube is automatically bar code read; its automated journey begins.

Specimen Carriers, whether empty or loaded with a specimen tube, are conveyed on the transport system, to destinations assigned by the Process Manager Computer. The Transport System centers around a recirculating link-belt conveyor. The unit is a single speed (50fpm), soft start conveyor with torque limiting clutch and 1/2 HP 220V drive. It is capable of moving at least 5,000 specimens per hour. The transport surface is divided into two lanes by three extruded aluminum guide rails. Gates let into the rails, control the route of the Specimen Carriers. The inner or Main Lane allows for rapid, unencumbered movement of specimens around the LAS. The outer or Collector Lane, which is divided into short, dedicated areas, guides sorted Specimen Carriers to specific handling areas and holds them for processing by operators, specimen managers or analyzers. While the conveyor forms a continuous loop, it can be physically configured into many shapes to meet physical plant limitations or encumbrances.

During its automated journey each Specimen Carrier must pass through a number of specimen routing modules or Gates. These Gates control all of the Specimen Carrier movements while on the Transport Conveyor, including stops/starts, lane changes, and bar code reading. A singe Gate can process in excess of 2,000 specimens per hour. The gates contain various features including bar-code readers which continuously check specimen identification and destination(s) by spinning the Specimen Carriers to orient the bar-code. A Diverter mechanism within the gate moves the Carrier and its specimen into a collector lane for analysis/storage or back into the main lane for transport to another area. If the LAS is having difficulty processing a specific specimen, the Specimen Carrier will be diverted by the gating system into a "reject" lane for manual intervention by the Operator. Gates controlling access to Specimen Managers also contain Orienter, Singulator and Shuttle devices. These Gate features ensure that each specimen and Specimen Carrier entering the Specimen Manager is properly oriented, is separated from other specimens and is fed in a continuous, efficient flow into and out of the Specimen Manager.

Where necessary, the **RRUSH™** system is equipped with Uncapping and Recapping stations. A specimen identified by the LAS as requiring uncapping is delivered into the uncapper. A tube Gripper in the Uncapper removes the tube from the Specimen Carrier and places it in the Cap Gripper. When the Cap Gripper has detected the presence of a cap, it grasps the cap. The Tube Gripper then lowers the tube and replaces it in the Carrier. The cap remains in the Cap Gripper which releases the cap into a disposal chute. The uncapper is able to process 450 tubes per hour. The Recapper reverses the process by delivering new caps from a hopper through an orienting device into a supply column. A singulator in the supply column provides a single cap at a time to a cap delivery mechanism. A Cap Inserter retrieves the cap from the delivery mechanism and inserts it into the waiting specimen tube.

Having been properly identified, oriented, singulated and uncapped each specimen is ready for delivery to a Specimen Manager. The Specimen Manager removes the specimen from the line and places it into one of several specimen trays depending on its destination. The Chemistry and Hematology Specimen Managers rely on a 4-axis system to deliver the specimen to the proper location. The X-axis moves the table, containing the trays, horizontally between the front and rear of the machine. The Y-axis contains an overhead gantry which moves horizontally at right angles to the X-axis. The Z-axis contains the gripper which is attached to the Y-axis and can move vertically to retrieve or place Specimen Tubes. The fourth axis is an orienting head attached to the gripper which allows the tube to be rotated in order to align the bar-code. The Specimen Manager can be programmed to load tubes into a manual handling rack or into analyzer specific racks for manual or automated delivery to an analyzer. A Specimen Manager can process approximately 400-600 specimens per hour.

A modified Specimen Manager is available to handle specimen tube storage. This is a 3-axis machine that does not require to orient specimen bar codes. However, since the storage location of each specimen must be known, each Storage Insert tray also contains a unique code so that both the specimen position and tray code can be forwarded to the Laboratory Information System.

Once tubes are sorted by the specimen manager into analyzer specific racks, the racks can be then loaded either manually or robotically into appropriate analyzers. When analyzed and returned to the Specimen Manager each specimen is checked by the Process Manager to determine whether it requires further testing by another analyzer, retesting by the same analyzer or to be sent for storage. The Process Managers ability to re-route a specimen for further testing in a timely manner, coupled with the LAS looped transport system allows the clinical laboratory to minimize reliance on aliquotting of primary tubes.

The **RRUSH™** system, while analyzer independent, has been designed to easily incorporate a robotic interface to most commercially available analytical equipment. In addition, the modularity and flexibility of the system provides the clinical laboratory with a wide variety of configuration options because of: a custom mix of automated and manual functions; number and type of workcells available; flexible transport system design; suitability for phased implementation; ability to accommodate space and structural limitations; ease of expandability or modification.

Anyone interested in receiving more information about the **RRUSH™** system or other innovative technology from **LAB-InterLink™ Canada Inc.** may do so by calling the us at 1-705-876-1220 or toll free 800-661-5229.