THE ABSOLUTE CHERRY-PICKING VISION

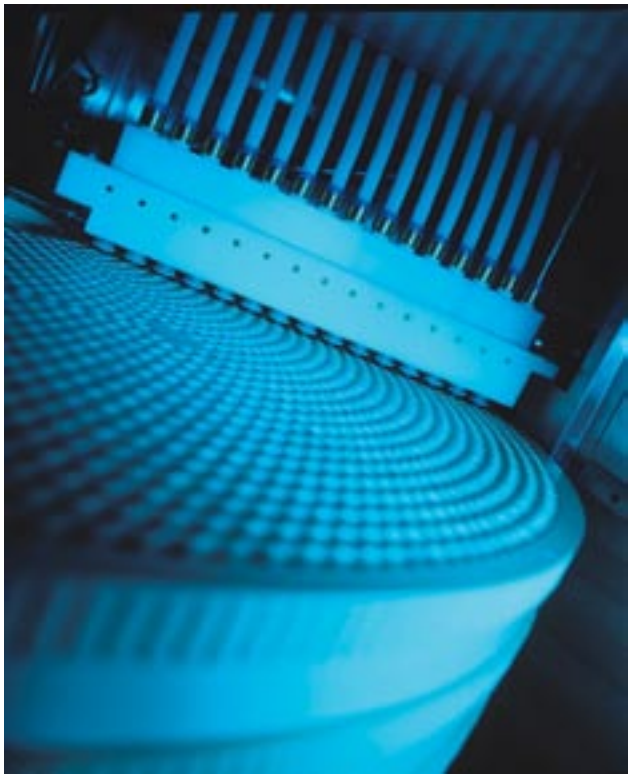
Pharmaceutical and biomedical research requires the safe storage and accurate retrieval. 'Cherry picking' can be made easier with bespoke code reading and advanced storage systems, without the need for complex robotics, as Jas Sanghera, from TTP Labtech explains

Laboratory Requirements

The nature of pharmaceutical and biomedical research requires the safe storage and accurate retrieval, testing and recording of literally hundreds of thousands of samples. If this is not done effectively, efficiently and safely, not only is it a significant waste of time and money but could prove to be hazardous to patients in the long term.

The vast majority of these primarily liquid samples are stored in 1.4ml tubes (about the size of a biro lid). For many years the only means of locating and individually accessing (cherry-picking) the required tube was via complex robotics based systems. The main problem is that ideally samples should be stored at -20°C in an inert environment, but at this extreme temperature the mechanical elements of robotic systems are unreliable or unable to function. End-user organisations were left with having to compromise on the storage temperature and environment in order to access the samples they needed for their research.

TTP's first step to solve this conundrum was the development and manufacture of a Haystack store, which held samples in refrigerated rooms. This proved satisfactory but the investment in custom rooms and equipment was only really justified for huge sample libraries i.e. five million. The vast majority of organisations wanted something smaller that could store and retrieve from a controlled environment and avoid the expense of custom rooms.



The next step

The TTP LabTech team, led by Dr Jas Sanghera, one of the company's founders, considered alternative means of moving storage tubes and settled on a pneumatics based system. This dramatically reduced the number of moving parts inside the chilled chamber and allowed samples to be stored at a range of temperatures from Ambient down to –20°C.

The final product, known as comPOUND, has the appearance of a large freezer cupboard and has a number of advantages over the older systems. The samples are all stored in a sealed environment chamber and enter and exit comPOUND through a pipe and air-lock, and can be thawed on exit if required. Technicians do not need to keep opening and closing large doors when doing so causes temperature fluctuations which affect energy usage and atmospheric control. comPOUND stores are also modular, so individual units containing 100,000 samples each can be connected to hold larger libraries.

"We had overcome many of the technical problems associated with the physical storage of sample tubes but 100% accuracy of data – knowing that you have the right tube – is vital to drug screening programmes. We needed to incorporate a scanner or reader of some sort into the system." Sanghera continues "We started with what was effectively a hand held-scanner bolted to the machine in a fixed position. This was a clumsy solution and subject to inconsistencies if the bolt should work loose or if a tube was not delivered to the exact focal reading point. Our second option was a fixed position scanner but this did not meet the exacting standards for reading. These screening programmes cannot afford a misread and levels of misread at 1/10,000 are not acceptable."

Many of the readers available at this time were only capable of reading complete codes, but with use, the coding on the tubes would often become scuffed or it may not have been printed true, thus rendering void the information stored in the bar code, and the expensive sample useless.

Richard Shaw, software engineer at TTP LabTech, takes up the development story, "The level of misread was also a problem with our next solution, combined with engineering problems that meant that the focal point could not be reliably replicated on each new reader. These required a lot of adjustment and calibration on the module once it was located in its final laboratory position.

It was at this stage, about four years ago, that we were approached by Absolute Vision, who were able to offer us a bespoke solution. Not only was the reader's position repeatable but it came with its own integral light source, thus removing the need for an additional piece of equipment within the system."

Leading edge provider

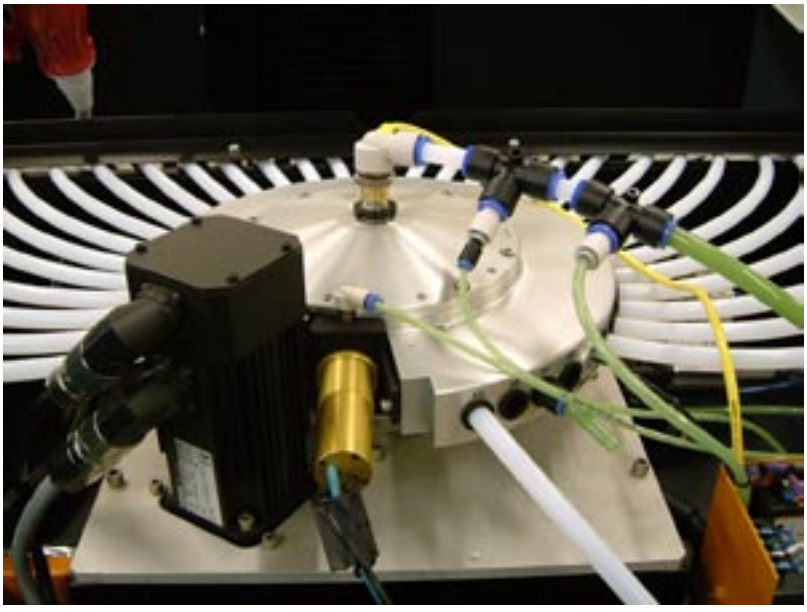
At this time Absolute Vision was establishing itself as a leading edge provider of readers and scanners for 2D Data Matrix technology. 2D Data Matrix is a square or rectangular array of dots or cells that stores information in 2D (two dimensions). It is rapidly becoming the standard marking technology for life science research due to its ability to hold more information in a smaller space and the robustness of its reading capability.

Peter Greenrod, Technical Development Manager for Absolute Vision and his team looked at TTP LabTech's problems and set about designing a solution. A key requirement for TTP LabTech was a guaranteed working distance for the focal point of the reader that could, in addition, cope with the harsh, industrial environment of the comPOUND storage module.

The resulting reader, the AV-M30 cylinder camera, which has a CCIR compliant screen, has now been adopted by TTP LabTech for all its comPOUND and comPILER systems (an extended sample preparation system that can select and prepare assay plates from multiple comPOUND storage stores). With the refinements to the reading system and advanced engineering design, each comPOUND module can identify, access and retrieve one individual sample out of 100,000 typically within 5 seconds, enabling it to process up to 15,000 microtubes a day.

In addition, TTP LabTech has been able to integrate Absolute Vision's powerful Medusa software into its own existing control software. This allows for a full integration between TTP LabTech's handling and control software, vital for maintaining and interrogating data on tube movements, and the readability and robustness of the 2D code reading solution found in the Medusa software.

Jas Sanghera commented, "With Absolute Vision, we have found the perfect product and business partner. The quality of the reader cannot be faulted and gives a level of reading accuracy far beyond the expectations of the project managers using our system. In addition, Absolute Vision's own ethos of innovative and responsive development and design has proved very rewarding for all concerned." Not only is the Absolute Vision reader now fitted as standard in the comPOUND system but TTP LabTech has also retrofitted it to the older systems that were already in the field.



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