

# Automated screening systems in plant biotechnology

Advanced Technologies Cambridge (ATC), a plant biotechnology company located on the Cambridge Science Park, UK, has chosen the Tecan Freedom EVO® 100 liquid handling workstation to perform complex pipetting tasks for setting up PCR screening assays.



ATC scientists (left to right), Rob Hurst, Matt Hope and Tim Beddoes

ATC was spun out from Twyford Plant Laboratories in 1988 as a wholly-owned subsidiary of British American Tobacco (BAT), and has in past years focused heavily on carbohydrate research, primarily to improve processing characteristics of potatoes and other crop plants. ATC has diversified into plant biotechnology and *in vitro* toxicological testing, with about 40 scientists involved in these two areas of research. The researchers at ATC enjoy a varied work environment, with opportunities

within tissue culture, molecular biology, biochemistry, genomics and toxicology.

The toxicological studies at ATC use cell-based models to study the effects of smoke condensates without using animals in their testing, while the plant biotechnology section is currently working on projects including harm reduction and improved agronomic traits in tobacco. "We are developing projects on harm reduction," explained Tim Beddoes, molecular biology technical specialist in

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the plant biotechnology section. “There are a number of toxicants in cigarette smoke with the potential to cause disease. These fall into several classes, for example nitrogenous compounds. The aim of the projects is to find ways to alter pathways within the plant that produce those compounds or their precursors. As part of these projects, transgenic plants are produced using a plant binary transformation vector to introduce genes of interest and common sequences. That common sequence can then be used to detect the presence of the introduced gene and determine how many copies of the gene have been introduced into those plants – a kind of quality control tool. In this way we can produce plants with defined genetics, which is essential for our plant breeding program and biochemical studies.”

“We use real-time quantitative PCR (QPCR) to assay for the introduced sequences, and our Tecan Freedom EVO 100 workstation sets up the reaction plates for the assay. We used to perform all of our pipetting work manually, but now run several thousand assays per month on average. Managing this throughput was one of the reasons we decided to automate the process and, at the same time, it was also important to free up people’s time to do other things as much as possible. We are using a 96-well format for this process at the moment, but plans to switch to a 384-well format in the near future have made automation essential.

The Freedom EVO 100 is also being used in the optimization of QPCR assays

where complex pipetting is involved, and may in future be used for some biochemical assays.”

“Our current set-up has an 8-channel liquid handling arm and uses the 50 µl disposable tips which have been developed by Tecan. We perform our QPCR in final reaction volumes of 25 µl, because using relatively small volumes obviously cuts down on reagent and sample costs, and the 50 µl tips are perfect for pipetting the 5 µl of DNA and 20 µl of master mix. The 50 µl tip is also ideal for aliquoting fractions for experimental replicates.”

“We have now optimized our method for setting up the reaction plates on the Freedom EVO with these tips. Test assays have confirmed pipetting accuracy, which we’ve been very happy with. The reproducibility is comparable to manual pipetting, but the tasks are performed much more quickly.”

“Our previous automated system was seldom used because it was not user-friendly. I visited other laboratories to see how they used automated systems, and received a lot of personal recommendations for the Freedom EVO, including from colleagues at ATC who had used Tecan workstations at their previous place of work.”

“We have had the Freedom EVO workstation for less than a year so far, and we are still developing and optimizing the system, so haven’t really pushed it to its full ability yet. We realize that there are still plenty of things that the system is capable of, and we are happy in the knowledge that we have that capacity for modification to handle new requirements in the future,” Tim concluded.

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