

PRESS RELEASE

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UCB life scientists use robots to test cells by the billion

An automated primary antibody screening work cell for early stage development of potential new treatments for central nervous system and immunology disorders has been designed and built for UCB by Farnborough-based Peak Analysis and Automation (PAA) Ltd. Built around a Mitsubishi Electric robot, the workcell speeds up the process of antibody discovery by allowing the screening of billions of antibody producing B cells.

To become a therapeutic candidate an antibody is required to have many desirable properties. As more is understood about the biochemical and biophysical properties of antibodies, so the list of desirable properties becomes longer. This quest for desirable properties produces more challenges for the area of antibody discovery; more antibodies need to be screened, tested and assessed, to allow the selection of the most suitable antibodies to progress. The process is underpinned by the careful design and selection of appropriate primary and secondary screening assay.

The workcell operates by combining high-throughput cell culture screening and identification with the isolation of single antigen specific B cells using a proprietary technique known as the 'fluorescent foci' method. The robot facilitates extremely efficient interrogation of the natural antibody repertoire. In a typical early stage screening campaign, a billion antibody producing B cells can be screened to find the ones with some of the desirable properties, a number that would be all but unimaginable if manual techniques were used.

"The workcell's efficient sampling allows the discovery of those few antibodies, which have required characteristics," explains Dr Malcolm Crook of PAA.

"The robot has to manipulate microplates containing the cells between several work stations, each time **using a multi axis movement. It also has to synchronise its movements with other functions within the workcell.**"

The Mitsubishi robot is highly dexterous, having six axes of movement. Further, for this application it has **been mounted on a ballscrew-driven travel base so** that it can move between two locations within the workcell to perform different tasks. This linear movement is fully integrated with the robot's own motion axes, using a Mitsubishi SSCNet high speed motion control network. PAA fitted the robot with a standalone controller with which the SSCNet is integrated, although Mitsubishi also uniquely offers robots that can be controlled via an integrated PLC rack-mounted robot controller.

The robot is a Mitsubishi model RV7-FLM-D1-S15, a unit that is popular for a range of applications from life sciences and precision assembly to manufacturing and materials handling. It weighs in at less than 67kg, but can lift 7kg, has a reach of over 900mm and a positioning accuracy of 0.02mm. Its waist axis can rotate through ± 240 deg, which gives it an all-around working envelope.

Significantly this robot model is rated to IP67, so can be used in demanding environments. It also offers very fast cycle times and has many safety features such as settable limits for speed, position and torque. Crook again: "The workcell is not only for human-targeted research but for the creation of research tools for proof-of-concept projects. Like all of our systems, the workcell is very flexible and should have a long working life as it can be easily reconfigured for new projects."

From its Farnborough base, PAA offers a complete design and manufacturing service for robotic and automated workcells for the pharmaceutical, biotechnology, healthcare and genomic research industries. Each workcell is designed for large sample size throughput and for complete data accuracy, integrity and traceability. In addition, the workcell is configured to allow easy modification and customisation for special duties.



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A key benefit of the antibody discovery workcell is that it reduces the time required to identify potential candidate antibodies compared to manual methods and thus delivers useful starting points from which to allow subsequent discovery of therapies and treatments in the downstream antibody discovery process far quicker than was previously possible. It also allows multiple projects to be carried out in parallel, thus addressing a broad spectrum of disease mediators.

With the workcell, the robot is then used to seed the cells into barcoded 96-well tissue culture plates at a density between 500 and 5000 cells per well. A typical experiment may use up to 500 plates. The robot then moves the filled plates to an incubator station where the cells divide and produce antibody. After a week's incubation the plates are moved by the robot onto a conveyor so that they can be transferred onto a screening workcell. In the screening workcell the cell culture supernatant is sampled and transferred to an assay plate by the robot. A carefully designed homogeneous, plate based, fluorescent screening assay is used to identify wells containing an antibody specific to the target protein.

The plates are then transferred in to the picking workcell where the positive well, cell culture supernatants are cherry picked by the robot and consolidated onto a barcoded master plate. Freezing media is added to the picked wells and the plate containing the cells is frozen down to -80°C. Further highly detailed analyses follow, at which stage it is possible to collect the genes of the best individual antibodies and go on to discover and develop therapies for specific diseases.

Crook sums up: "Only by starting with a very large number of cells is it possible to identify those few antibodies in early stage screening from which new treatments can be subsequently developed and only robotic automation makes this a viable process."

The Mitsubishi model RV7-FLM-D1-S15 robot is recognised as setting the benchmark standards for speed, flexibility, ease of integration and simplicity of programming for laboratory work and a wide range of other applications.

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The role of Industrial Automation – UK Branch is to manage sales, service and support across its network of local branches and distributors throughout United Kingdom.

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