



Dr. Paul Pankhurst, CEO

In Conversation with  
**Quantex Arc Ltd**  
Leadership: 'We're  
Continuously  
Striving to Improve  
and Expand Our  
Suite of Products,  
Developing  
Cost-Saving  
Bespoke  
Solutions for Our  
Customers, and  
Most Importantly,  
Enabling  
Big-Impact,  
Game-Changing  
Fluid Delivery  
Solutions'

*"We have recently announced 'Eco' versions of our pumps that are 100 percent recyclable and nearly 12 percent lighter on average."*

**“** *We envision that our disruptive pump technology will help to improve remote care for patients, save gigatons of single-use plastic waste, reduce shipping weight/volume, and eliminate aerosols.”*

**Q**uantex Arc Ltd is the innovative leader in disposable pump technology. It provides a catalogue of single-use pumps and a design and development service for custom applications. The company's engineers and designers are on hand to provide design expertise throughout the development programme and assistance in establishing volume production.

Quantex was established in 2009 and is based in London.

**Dr. Paul Pankhurst & Gillian Harding-Moore, Quantex Arc Ltd CEO & Director of Global Marketing Respectively, spoke exclusively to The Silicon Review. Below is an excerpt.**

***Explain your services in brief, Dr. Pankhurst.***

Our pump technology is unique because the pumps are sufficiently low-cost, that they can be considered part of the disposable. They typically attach to the fluid pack and are replaced along with the replenishment of each pack. The pumps are driven by a simple, low-cost stepper motor, which forms part of the enduring equipment. This means that when the pack is inserted into a dispensing machine or fluid delivery device, the only connection point is the pump engaging with the motor's driveshaft. No fluid needs to pass through the machine itself. This eliminates the need for internal cleaning of the dispenser. Apart from providing a highly sanitary dispense solution, the pumps never need calibrating and are replaced with every new pack. The machines

are less complex, the cost of maintenance is greatly reduced, and reliability improved.

It took six years of R&D to perfect the pumps for high-volume manufacture while ensuring quality and performance. During this time, Quantex was supported by exclusivity agreements with a few global companies that believed in the technology. In 2018, the U.S.-based flow control solutions company, Vernay, became a strategic partner using its global sales team across the Americas, Europe, and the Asia Pacific to help grow the business.

Vernay subsequently made an investment in our company, which enabled the business to build a top-level team and ramp up our innovation activities.

***What was your motivation behind developing single-use, recyclable pump technology, Dr. Pankhurst?***

Our first pump was invented whilst I was CEO of product innovation firm, PDD: a global pharmaceutical company approached us wanting a new peristaltic pump with higher precision at a lower cost. Squeezing a piece of elastomeric tubing is inherently inaccurate and linearizing the output requires expensive sensors and software compensation. We set about designing a new single-use pump that uses a positive displacement rotary action, where fixed volumes (boluses) are transported. Therefore, a high accuracy can be achieved. The solution not only eliminated the need for sensors and software, but the mechanics required to drive the pump were simplified and far less costly than the complicated mechanics required to squeeze a piece of peristaltic tubing.

***Dr. Pankhurst, what are the areas covered by your patent? And how well has the patent contributed to your success?***

We have protected our 'rotary fixed displacement' technology with a total of 90 global patents in 21 countries, with 70 granted so far. In addition, there is considerable know-how locked into the manufacturing processes, robotics, and automated assembly lines required to produce extremely reliable pumps at a low cost. Having such strong protection in place liberates us, as a company, from concerns about competition and enables us to collaborate with our customers and partner with synergistic companies in development projects.

***Ms. Harding-Moore, with market research, companies sometimes find the results of a study difficult to believe, unclear or mixed. Tell us about your decision-making method.***

We use market research to understand the existing market-size potential. Still, since we're continually delivering disruptive innovation where customers cannot define their unmet needs, there is a limit to how much insight market research can provide. Therefore, our innovation decisions are typically based on a visionary perspective of global trends, including technological advancements, proposed changes in legislation, cultural movements, and global environmental sustainability goals. Recognizing applications where the unique pump technology can make a big impact is key to reaching these markets. We have carved out several ground-breaking application opportunities for our pumps.

Two examples of these are as follows:

- To help our customers fast-track into the connected devices market, we have developed a highly compact and robust drug delivery IoT reference platform called Quantex 4C, where doctors can program and monitor infusions remotely. At the same time, patients or caregivers can administer using a smartphone app that reports live infusion data from the device via Bluetooth or NFC. This innovation responds to the need to keep patients out of hospitals and in remote care, which is now even higher on the agenda due to the Covid-19 pandemic. The reference platform is agnostic to fluid primary pack and can pump high viscosities against high back pressures, such as those created by fine needles. This means that it can work with a range of different fluid-types, providing a strong core product from which pharmaceutical or medical nutrition companies can customize their bespoke drug delivery or enteral feeding needs and fast-track a connected device to market.
- Using our high-pressure pumps that generate pressures up to six bar, we have developed a battery-powered, reusable device called the Eco Freedom Sprayer that produces a fine, even spray that matches aerosol quality without the use of harmful propellant gases. The single-use packaging for the sprayer (which consists of a lightweight plastic pouch, pump, and spray nozzle) can reduce packaging weight by up to 98 percent compared with the equivalent product weights in aerosol cans. Two-thirds of the product volume in aerosol cans comprises propellant gases and empty headspace, so the Eco Freedom Sprayer can also greatly reduce shipping volume. Applications for the sprayer span across several markets, including garden care, paint, industrial cleaning, and vehicle maintenance.

The Eco Freedom Sprayer is set to replace aerosol cans and large single-use plastic canisters (typically used for fertilizers and weedkillers) that need to be pumped by hand. It also replaces trigger sprays to overcome repetitive sprain injury for janitors while providing a superior quality spray-mist. Future development of the device is planned that will adapt its design for personal care and homecare products.

***Quantex's mission reads, 'to continue to innovate and improve pump technology'. Your technology and products already being revolutionary; what lies ahead for Quantex? Do you have the fresh technical talent to stay ahead in the competition, Dr. Pankhurst?***

We're continually improving our pump technology for performance and accuracy, driving down cost for high-volume manufacture, and ease of integration into machinery or devices. For example, a new version of the LR-20 uses a clip feature to make it easier to attach to a chassis inside a machine and align with the motor drive. Due to the clip mechanism being on the pump instead of the chassis, the wearing element now forms part of the disposable instead of the enduring equipment. This means that the chassis is simpler to manufacture, easier to clean, has no moving parts to service, and will last longer. We have also recently launched a new pump called QX-13 to replace our LR-13 and AM-13 pumps. The QX-13 combines the learnings from 10 years of R&D, combining all the pumps' best attributes.

Further to this, we have recently announced 'Eco' versions of our pumps that are 100 percent recyclable and nearly 12 percent lighter on average. Our standard pumps are approximately 83 percent recyclable, being mostly comprised of polypropylene and HDPE; however, they contain a silicone spring that pressurizes and seals the pumps and a nitrile rubber lipseal at the point

of connection with the motor. Although the standard pumps are being recycled by some customers using grinding and flotation methods, it is not as easy as it could be. In the Eco pumps, the silicone spring has been removed, and the pressure is instead applied by a low-cost air pump that comprises part of the machine. The rubber lipseal (which is less than three percent of the pump weight) is replaced by a thermoplastic rubber, which can go through the same recycling stream as the rest of the pump material.

***What are your trajectories for the next five years, Ms. Harding-Moore?***

We have a relatively small team, but our business is highly scalable as the pump sales grow exponentially. We have a dedicated manufacturing partner, CTA, which has been scaling up our manufacturing facilities to meet demand with lights-out, cleanroom facilities, state of the art injection molding machines, 6-axis robots, and auto-assembly lines. This manufacturing partnership allows our core team to focus on R&D, testing, customer services, and sales and marketing.

Our mission is to enable disruptive, game-changing dispense/dosing solutions that improve the end-user experience and meet global environmental goals. We envision that our game-changing pumps will become a standard 'engine' in device and dispenser design, making a huge contribution to improving remote care for patients, save gigatons of single-use plastic waste, reduce shipping weight and volume, and eliminate aerosols.

***The Leaders at the Helm of Quantex Arc Ltd***

**Dr. Paul Pankhurst** serves as the **Chief Executive Officer** of Quantex Arc Ltd.

**Gillian Harding-Moore** serves as the **Director of Global Marketing** of Quantex Arc Ltd.