Quantex

A novel approach to pumping

Background

Quantex is part of PDD Group Ltd. Quantex analysed the medical pumping market and realised that there are numerous types of pumps (diaphragm, peristaltic, syringe etc) being used for different pumping applications. There was not one pumping technology that was appropriate for the accuracy and low dispensed volumes at one end of the application scale to the high flow rates required at the other end.

Quantex believed there was a huge market opportunity for a highly accurate but simple, low cost technology that could span the performance demands of all the medical pumping requirements.

The Response

Following a rationalisation of technology options, Quantex decided to approach the challenge from a new angle. Instead of making more complicated and expensive pumps that would have reliability and maintenance issues and would have to be calibrated or restricted to specific IV sets, why not make the pump part of the disposable and keep the drive and control unit simple and cheap?

The result of this approach is an innovative rotary, positive displacement pump, designed for high accuracy and very low cost that overcomes many of the deficiencies of peristaltic, syringe and diaphragm pumps. The new mechanism is not sensitive to pressure and temperature effects and by using a rotary motion, continuous flow can be achieved, leading to uses where constancy of flow at low rates is important.

Tested to medical device standards, the patented concept can be customised to suit specific applications, including intravenous infusion, fluid chemistry, immunoassay, HPLC, high accuracy sampling pumps, automated pathology, high throughput screening, micro volume dispensing, bottled home medicines and many others.

Features of the pump include:

- A fully reversible, continuous flow rate of 2µl/min to 30ml/min (1800ml/h)
- Scalable to higher and lower rates
- A fluid viscosity range of up to 100cp
- 22mm x 22mm in size
- ±1% accuracy
- Disposable
- Low cost – only 2 parts

To demonstrate the benefits of the concept, Quantex decided to develop a full hospital pump. In collaboration with St Bartholomew's Hospital in London, Quantex sought to define both performance and end user needs. PDD interaction designers worked closely with nurses to understand pressures and challenges of their working days or nights. Through a process of iterative design, testing and refinement, PDD was contracted to develop a product that is easy to mount on poles or beds, has foolproof loading of the disposable and a simple and intuitive user interface that tells the nurses, doctors or biomeds the information they need to know, when they need to know it.

The pump unit is compact and lightweight and because accuracy is controlled within the disposable element, the drive is a simple stepper motor. This, combined with the development of innovative occlusion sensing keeps part count and cost low and, through keeping the mechanism simple, maximizes reliability and product life.

A fully functional prototype has been produced and is undergoing extensive verification and validation testing. Results to date show that the performance is exceeding all expectations.

The Result

Quantex is in negotiation with several parties in the medical and other sectors that are interested in licensing this innovative approach to pumping challenges.

This project demonstrates PDD's ability to analyse markets, identify opportunities, generate valuable IP and design and develop innovative and commercially viable product solutions.

For more information email **info@pdd.co.uk** or visit our website:

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