



# Medical goes high tech

Continuous advancements in IT and communications solutions, which make medical devices easier to use and more difficult to misuse, are supporting the spread of telehealthcare in the UK. This has generated increasing demand for telemetry and ambulatory products, which can be used safely in the home by patients or carers and supervised remotely by clinicians and used more effectively in hospitals.

The demands for in hospital products which are smaller and easier to use has spawned the growing popularity of telehealthcare among medical professionals and has been driven by the greater availability of technology – for example broadband connections in people's homes and the growing acceptability of wireless in healthcare organisations – plus the constant need to achieve new efficiencies and cost savings in the NHS.

The evolution of ward products that can be monitored remotely from either the ward office or some other location has led to the development of products which can now be used in the home which allow for better and more frequent communication between patient and clinician.

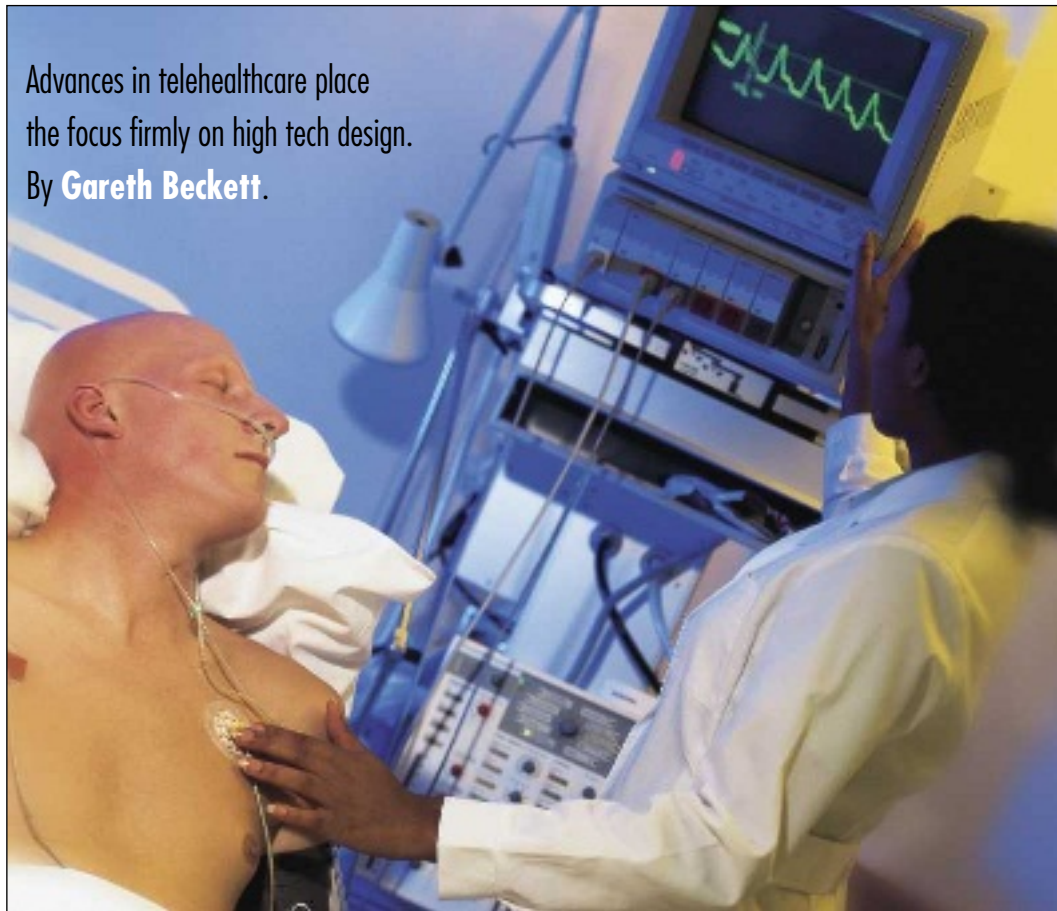
As this further develops, there will be greater emphasis on superior cost effective product design leading to greater collaboration between designers and manufacturers to create the next generation of easy to use, safe and reliable in home or mobile patient devices.

Where practicality and functionality once dominated the product development stage; the traditional heavy industrial appearance of medical products is being replaced by more patient friendly aesthetically pleasing designs.

Such changes are increasingly dictating the process through which designers and electronic manufacturing service (EMS) providers engage, consult and develop

Advances in telehealthcare place the focus firmly on high tech design.

By **Gareth Beckett.**



electronic medical devices. In particular, this has led to a need for greater collaboration earlier in the design stage.

Modern day design and manufacture for the medical sector does not focus solely on the development of high level technology and industrial looking systems. In fact, the product developments that Axiom encounters can be found at both ends of the electronic design spectrum.

At the more traditional end, the focus clearly remains on technological product development. Take, for example, the design and manufacture of high voltage, highly functional products such as rf plasma generators pictured on the follow-

ing page. These devices use high powered pulsed bipolar energy, enabling surgeons to perform highly complex procedures, such as keyhole surgery, and, increasingly, cosmetic surgery. Here, the design process results in a product with an entirely functional form factor.

In these instances, size, appearance and intuitive operation are less of an issue for product designers. In terms of manufacture, it follows the surface mount/through hole hybrid approach, where you still find a proliferation of traditional electronic through hole components – such as wire wound resistors, toroidal coils and ferrites – inserted into heavily copper clad pcbs



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and finished using reflow and wave soldering processes.

However, with the need for increasingly ‘intelligent’ ward based products and telehealthcare driving new product design and development, devices are becoming smaller and this means greater attention must be paid to accessibility, safety, fail safes and ease of use. In turn, this demands more innovative approaches to design, assembly and test.

Let’s take the intravenous pump driver as an example. This complex product is required to be user friendly, compact, lightweight, reliable and robust, whilst its battery power allows it to operate in and around hospital and in patients’ homes.

Whilst legacy solutions have tended to rely on serial communications, there are moves to accept other technologies, such as wireless, which support fast data updates and patient peace of mind.

As form factors reduce, products are required to have a more high tech ‘look and feel’ and to be easier to use and less able to be misused. This means a change to the whole design structure and process. There is a more complex pcb design and this will usually mean the need for several supporting boards. In the case of the intravenous pump driver, the pcb will require use of high density surface mounted components, due to the limited ‘real estate’.

Along with the demands in functionality comes the need for more memory and greater use of bgas and 0402 passives.

Despite the potential benefits of miniaturisation on the design process, circuit board design poses assembly and test challenges. This has led to test solutions which take advantage of, for example, Jtag technology.

As developments progress, we have witnessed – and will continue to see – older industrial style medical products replaced with modern more aesthetically pleasing designed equipment.

Such changes are lifting the bar on electronic design and assembly technology, requiring that both functions accommodate the limited space available within the product’s external casing in

which to mount pcbs, motors and encoders for example, and/or the necessary electromechanical parts.

Early introduction of design for test, design for procurement and design for manufacture is vital. This will confirm that the design processes and components are valid and reduce risk of early market failure – issues which may not naturally occur to designers.

### Engaging early

Involving the EMS provider at an early stage in the design process or by outsourcing design to these providers, gives the OEM the opportunity of providing an early warning on whether or not a particular design approach will work. Added to that is the EMS provider’s ability to provide early costing and to build an effective supply chain.

If left unaddressed, such problems could lead to late time to market due to difficulty of manufacture or long product lead times. Worse still, this could lead to unreliable products for this highly life critical sector.

Whilst medical design and manufacture cannot be aligned with the aesthetic appeal of high volume consumer goods such as Apple Macs or iPods, end users are calling for easy to use, accessible, attractive and reliable products.

Designers and manufacturers will increasingly face challenges to produce these multi faceted products and a greater emphasis on collaboration throughout can boost efficiency, reduce time and realise cost savings across the board.

### Author profile:

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Gyrus’ G400 plasma generator is just one of the medical products on which Axiom has collaborated

