

Design conscious

Developments in the field of medical devices promise to improve the lives of both doctors and patients, and good design is an essential factor. **Julia Pierce** reports

THE UK MEDICAL devices market is the third largest in Europe behind Germany and France, making it one of the most significant in the world.

That makes it an important target for innovations by both UK and international companies — something that is yielding benefits for patients and doctors alike.

Recent developments are helping doctors make the treatment of patients faster and more comfortable for both parties. An example of this is Siemens Medical Solutions' SOMATOM Definition AS, a CT scanner that adapts to virtually any patient and clinical need. It is suitable for routine diagnostic work and complex examinations such as oncology, neurology and cardiology, and the first system has recently been installed at the University Hospital Trauma Centre in Erlangen, Germany.

The device is faster than previous versions, which makes the treatment of children and the claustrophobic much easier. The patient table is moving continuously, so a larger area can be imaged and entire organs and functions can be examined with a single scan, rather than just a portion of them.

Well-designed equipment can also make doctors more comfortable during operations that are often long and complex. Siemens' Artis zeego, a highly flexible multi-axis imaging system based on robotic technology from the industrial automation world, is one such device.

'It has eight axes of movement rather than the normal three, so you can adjust the table height to suit different sizes of doctor,' said Peter Harrison, director of imaging and oncology at Siemens Medical. 'It is used in intervention rooms where, for example, someone is having a catheter inserted through their groin to go and place a stent in their heart.'

'But complex cases may require a lot of additional equipment in the room, so space is at a premium. Our device has various park areas. This means it can even be pushed up to the ceiling to move it out of the way.' The imaging



Design Edge's prosthetic foot for Icelandic company Ossur needed to combine ease of use with hardwearing materials and wearability

system can even remain functional when the operating table is tilted — to aid a patient's breathing, for example.

However, the increasing complexity of medical devices and their reliance on computer power is causing some problems.

'Devices are becoming more complex and software-dependant, but the bugs and so forth that are present in programs are a problem,' said PJ Tanzillo, National Instruments' LabVIEW embedded product manager and biomedical *continues 42* →

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segment leader. 'Software recalls of medical devices are at an all-time high. The industry is therefore looking at ways of providing devices that have been bug-tested to mission-critical level, as occurs in the automotive and aerospace industries.' Tanzillo said device makers are looking at existing software regulations in those industries, although talks on what form anything governing the medical arena should take are still at an early stage.

The company's CompactRIO data acquisition and control system and its LabVIEW graphical programming language were used by Californian company Sanarus Medical to create a surgery-free and less expensive method of destroying uncomfortable benign breast tumours. Fibroadenoma, a common benign lesion of the breast, can cause deformity and discomfort to sufferers. Surgery to remove them is lengthy and costly, but an alternative treatment — cryoablation guided by ultrasound — can now be used instead.

The process selectively freezes and destroys tissue in the target area and can be performed under a local, rather than general, anaesthetic. In the operation, liquid nitrogen is delivered to a probe inserted directly into the lesion in the breast. Under the direction of an operator, the ultra-cold temperature created at the tip of the probe twice creates an iceball of a specified size engulfing the fibroadenoma, before the tip is warmed again so it can be detached from the ice ball and removed. The body then reabsorbs the tumour.

While work is being carried out to make sure the computer-reliant portions of devices are as robust as possible, a revolution in design is also taking place. In the past in the UK, the appearance of a device may have come second to functionality. However, increasingly this is not longer the case, and it is becoming recognised that design specialists may add value to products and even cut manufacturing costs.

'There is an increasing need to think about the user and ergonomics now,' said Alasdair Barnett, a partner at Cambridge-based industrial design and electromechanical engineering specialist Design Edge. 'People want functionality and a simple user interface, but also impressive styling. Part of the reason for this is the lead that has been given by the consumer market through the popularity

of equipment from companies such as Apple. Having something that is a joy to use is a big selling point.'

Among Design Edge's recent work is a prosthetic foot for Icelandic company Ossur that needed to combine ease of use with hardwearing materials and wearability. The company also designed a breathalyser-style device for rapid screening of infectious diseases for Rapid Biosensor Systems. The device can screen for results in a matter of minutes, rather than days or weeks, and is initially being tested for use in detecting tuberculosis.

'People think good design comes at an additional cost,' said Barnett. 'However, something that has been well thought-out will probably not be more expensive to make, and you are likely to make back the design costs in extra sales. Good design reduces assembly and production expenditure — for

example, you may require fewer components. Design is not just about adding good looks.'

So what will we see from the industry in 2008? NI's Tanzillo said this year is likely to see some interesting developments that will benefit the market in general.

'One area where there is likely to be activity is simulation — the building of the ability to do both software and hardware simulation for rugged testing,' he said. He also flags up developments in the move towards incorporating wireless technology into the industry.

But Tanzillo believes the field of safety and testing is likely to be busiest. 'There is a high cost for failure,' he said. 'If a computer goes down, then you can just reboot it. But if a heart-lung machine stops working, it is critical.'

'People want functionality and a simple user interface, plus impressive styling, a lead set by the consumer market' Alasdair Barnett, Design Edge

Design Edge's breathalyser-style device for rapid screening of infectious diseases, designed for Rapid Biosensor Systems, is initially being tested for use in detecting TB





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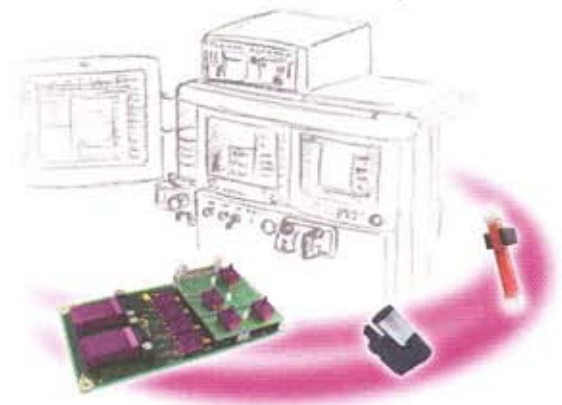
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