

newdesign

issue116/2015

Patient approach

Medical design special

Cabin crew

Aircraft interiors

On trend

Milan 2015



Medical | Aviation | Trends | Consultancy | Events | Lighting

Renfrew

Masters of science

Renfrew Group International's work in the medical design sector engages clients from start-up companies to global organisations

Renfrew Group International (RGI) is one of the UK's foremost product design companies and has spent over 30 years using the insight and design expertise of its staff to deliver successful products. The company works across product, automotive, and motorcycle design as well as offering a range of engineering and prototyping services. However, at the current time more than 60 per cent of the consultancy's work is in the medical and scientific sector.

In the medical space, RGI works with a mixture of private start-up companies and larger public sector bodies (including the NHS and the Department of Health) alongside an increasing number of funded programmes led by academics or clinicians in which RGI provides the bridge from research to commercial realisation of the project.

Akin to the other sectors in which RGI operates, in medical the consultancy helps its clients achieve their objectives with compelling innovations and attractive design propositions, typically generating new intellectual property as part of the commission.

"We look at the whole way that things are done," says Mike Phillips, Renfrew design and innovation specialist. "We consider the interaction with the patient and the clinical care worker and how design and physical pieces of equipment can make a difference."

To give an example of the Group's work with university clients, RGI are currently collaborating

with a new company Oxford Medical Diagnostics (OMD), a spin out from Oxford University, on a non-invasive blood sugar detector that works by sensing ketones in the breath. "Starting from the lab bench top prototype from OMD, we worked with them to enhance its performance and miniaturize the package," explains Phillips. "We designed for user-centred performance and user trials whilst thinking at the same time about production: moving from first iterations of one-off prototypes, to twenty-offs for user trials and then on to hundreds, and on to high volume production units."

The project has received several phases of funding from the healthcare arm of the Small Business Research Initiative (SBRI) and multiple

prototypes for user trial will be completed by the end of the year.

At the other end of the physical scale spectrum, RGI works on larger projects for big organisations, the NHS for example. Over recent years RGI has been considering infection control and, in particular, how the principles of design and engineering might be used to tackle this important challenge.

Infections with differing transmission vectors and symptom profiles present different design, technical and ethical challenges. RGI has worked on a range of emerging situations usually in close collaboration with clinical and frontline staff as well as manufacturers. In combination and as a whole, the work could be described as Isolation technology; a range of different and novel solutions appropriate to different diseases and importantly in different settings and environments.

"In multi bed ward scenarios, with more common level infections, we have looked at airflow management around the bed, producing cubicles with negative pressure whilst considering patient privacy and dignity, as well as more challenging localised air curtains without physical walls," continues Phillips.

"We use visualisation and prototyping extensively to test the design and human interactions in complex environments. CFD and smoke and biomarker test rigs underpin the science".

"Each situation has a different level of priority – how this is managed is so often the defining matter





Opposite | Early stage portable breath analyser (ketones/blood sugar)

Left | Temporary Isolation Room. Filtered air, negative pressure

Below L-R | Temporary Isolation Room, designed to be a pleasant environment | Isolation without walls... Air curtain | CFD showing 99.8% extraction. Smoke rigs built simultaneously.

in a successful design solution. Our process helps describe and reconcile the opposing needs, ideally turning them to align with each other. Patient needs can in some cases be diametrically opposed to other criteria.

RGI has also explored the possibility of a patient isolation suit, turning the problem of Ebola control on its head. Sometimes a concept is put forward to challenge the status quo; to ask some basic questions in order to elicit a new approach from all those involved with seemingly intractable problems"

The Patient Isolation Suit, proposed by Bruce Renfrew, would involve a sealed environment to be worn by an infectious person which acts to contain microbiological material such as pathogens, spores and viruses. The design is currently being assessed by the WHO Compendium secretariat.

The concept offers enhanced patient handling capabilities yet safely separates the operator from the diseased patient affected with a dangerous virus. For a growing number of such diseases the

current facilities in hospitals are no longer believed to be adequate, leading to a shift towards isolation technology to offer the level of protection demanded by current thinking and legislation.

Current protocol requires health workers to wear protective suits whilst transporting and nursing patients with an infectious disease. Patients are nursed in isolation rooms or enclosures, some with air filtration under negative pressure, and nursing staff must adhere to strictly controlled routines. The RGI design puts the patient in the protective suit rather than everyone else having to be so protected.

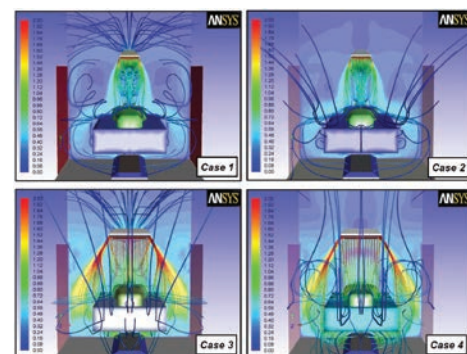
The solution consists of a suit of generous proportions, constructed of transparent or semi transparent, or opaque, fluid proof materials, which are also impervious to the passage of microbiological organisms such as bacteria and viruses, and which incorporate hermetically sealed seams and closures. The suit will incorporate integral sleeves for the patient's arms, and these in turn would incorporate integral gloves or mittens for the patient's hands. The suit will also

incorporate integral leg enclosures for the patient's legs. The patient would enjoy complete freedom of movement for comfort and for interaction with personal possessions and those around them.

Whilst the Patient Isolation Suit project represents an open-ended thought-based project, RGI also does much work with clients on re-engineering or updating the design of particular medical devices, making them perform better, easier to manufacture or cheaper to the end user.

"There are essentially two parts to what we do: you might say 'the science of design' and 'the design of science'," concludes Phillips. "People are only likely to make change if they really want something. A lot of what we do focuses on that – the eye and the brain are in combination an extraordinarily powerful and fast assessment tool, imparting subtle information on the 'rightness of something', important even in the most functional environment. Using design correctly in the process of discovery through to development and production is where we can add extra value."

www.renfrewgroup.com






RENFREW GROUP INTERNATIONAL
www.renfrewgroup.com

Intelligent Energy 100kW automotive fuel cell - Industrial design and full scale model