ENGINEERS IRELAND
ENGINEERS IRELAND EXCELLENCE AWARDS 2011
In association with: ESB

JOHN POWER

Vote for your favourite Irish engineering project

We are pleased to announce the shortlist for the 2011 Engineers Ireland Excellence Awards in association with ESB. With the success of the inaugural awards last year we are delighted to once again showcase Irish engineering at its best.

This week we feature the fifth and sixth of the eight nominees in the Engineering Project of the Year shortlist. The projects featured over the next two weeks will be:

■ Today, September 25
Aeroneb Solo II Project – Aerogen

Great Northern Haven – Dundalk Town Council/MCO Projects/Netwell/CASALA Centre DkIT

■ Sunday October 2
M50 PPP Scheme – ATKINS
Roads Service DBFO – Lagan Ferrovial

The other four shortlisted projects are:
■ New Engineering Building – NUI Galway
■ Trinity College Biomedical Sciences Institute – ARUP/Walls Construction
■ The Peace Bridge, Derry – GRAHAM Construction/Ilex URC
■ The Mizen Head Footbridge – RPS/Carillion Irishenco

The winning project will be judged on the largest number of online votes received by midnight on November 3 and the winner will be announced at a special awards ceremony in The Four Seasons Hotel, Dublin on Friday, November 4.

Visit www.engineersireland.ie/excellenceawards to register your vote. May the best project win!

John Power is a Chartered Engineer and Director General of Engineers Ireland

Engineering Project of the Year kindly sponsored by the

NRA An tÚdarás um Bóithre Náisiúnta National Roads Authority

Aeroneb Solo II Project – Aerogen

A giant leap forward in respiratory innovation

Aerogen's aerosol drug delivery system is a revolutionary new product, which will be particularly helpful for treating newborns

Developed by Galway-based medical device company Aerogen, the Aeroneb Solo is an innovative aerosol drug delivery system developed for the acute care market.

Aerogen's technology stands apart from its competitors due to its unique engineering prowess. Traditional nebulisers use oxygen or compressed air through a compressor to 'push' the drug into the patient. Aerogen's vibrating mesh technology works through the use of a domed vibrating mesh aperture plate which receives liquid drug on its top surface. Through the use of the plate's unique geometry and vibration, it produces a fine droplet mist to create an aerosol.

The lack of a compressor allows the Aeroneb Solo to be used on newborn infants whose sensitive ears cannot cope with the noise of a compressor. The limited lung capacity of tiny infants means that any additional air or oxygen flow can overextend the lungs. The ability to deliver essential drugs into the lungs of newborn infants is a main selling feature of the Aeroneb Solo.

Aerogen recognised that its bespoke technology had the capacity to be a market leader, but that key developments were required in precision delivery of the drug to the targeted lung.

Two years ago the company set out to make advancements in its process engineering to create the necessary scalability, and in its process design to ensure the reliability of the vibrating mesh technology. This project was called the Aeroneb Solo II project and had two objectives. One was to develop a fuller understanding of the manufacturing process to enable less wastage and increase capacity. The other was to repatriate the manufacturing from the Far East to Ireland.

Aeroneb Solo II Project – Aerogen

Through an innovative approach using the collective skill set of universities, government agencies and industrial organisations, the highly skilled process of plate formation was successfully defined, understood and replicated.

The Aerogen team successfully set up and validated a scalable production process for manufacturing reliable aperture plates for nebulisation, increasing capacities from 100,000 to four million units per year.

The cost of the aperture plate, representing 30 per cent of the nebuliser cost, was significantly reduced. The lowered cost, coupled with the reliability and the scalability of the process, has opened up opportunities for Aerogen to develop partnered drug programmes with pharmaceutical companies.

Repatriation of the Aeroneb Solo was key to its success. The nebulisers had previously been produced using a supply chain involving ten companies in five countries with typical lead times of months. To prepare for future growth Aerogen needed a more reliable and predictable manufacturing process and supply chains.

The Solo II represents a leap forward in respiratory innovation enabling a high end, customised device to be upscaled and manufactured in a reliable, highly engineered and automated process in Ireland.

Innovative engineering and alliances

''The Irish medical device industry is a phenomenal success,'' said John Power, managing director of Aerogen. ''The fourth largest exporter in the world, we now ship €7.2 billion worth of product annually, employing 25,000 people, the highest number of people working in the industry in any country in Europe per head of population.

''Moving up the value chain, the Aerogen Solo II project demonstrates that we also have the engineering capability to become world leaders in med-tech innovation.

''Aerogen has shown that design for automation and value engineering principles products like Solo II can be produced in Ireland at a quality and price level that can compete and win against low cost regions in the Far East and other areas.

''Since repatriation of the Aeroneb Solo from Asia, margins from the product have doubled and quality and logistics have improved significantly.''

Power said Aerogen had developed strategic alliances with many of the top research facilities in Irish universities, enabling the company to leverage homegrown research to facilitate its rapid growth.

''This symbiotic relationship with local, regional and national universities enables Aerogen to leapfrog ahead in terms of R&D, while enabling universities to form strong links with the medical technology sector,'' he said.

Research centres such as the University of Limerick, Athlone Institute of Technology, Trinity College Dublin and the Tyndall Institute have all collaborated with Aerogen in this project.

''Enterprise Ireland has been a great supporter of the company in this project and we share their vision for developing a culture of engineering innovation in the med-tech sector,'' said Power.

The Solo II project is having a direct impact on the local economy in both Limerick and Galway. Molex, Aerogen's manufacturing partner in Shannon, sees the success of the product as a catalyst for developing further automated medical product production at the site.

Galway company Qualtech has benefited from the increased global demand for Solo II, which has resulted in increased sales of the electronic controllers it produces for Aerogen to drive the nebuliser.

At Aerogen's development centre on the outskirts of Galway city, the company has this year added 14 personnel to its mostly third level engineering and science graduates, many of whom are qualified to PhD level.

''This work in Ireland has helped to copperfasten Aerogen's unique technology and is facilitating our small and exciting company to be the gold standard in drug delivery systems,'' Power said. ''We now ship our products to more than 65 countries worldwide and are growing at 30 per cent per year.''

Such is the success of this project that the technology is now integrated into Philips, Maquet and General Electric Medical systems technologies under the Aerogen brand name.

Great Northern Haven – Dundalk Town Council/MCO Projects/Netwell/CASALA Centre DkIT

A design for a better way of life

The Great Northern Haven housing project in Dundalk is a fine example of how assisted living technologies can enhance the lives of older people

Great Northern Haven is a sustainable housing project in Dundalk, designed and project managed by MCO Projects on behalf of Dundalk Town Council. The scheme provides a new energy-efficient adaptive housing model for older people that will enable residents to live independently in their homes for longer through intelligent design and the use of innovative sensor technology.

The Great Northern Haven project is a unique collaboration between Dundalk Town Council, the Health Service Executive (HSE) and Dundalk Institute of Technology (DkIT) with funding from the Department of the Environment, Heritage and Local Government; Louth local authorities; the Sustainable Energy Authority of Ireland; and the Atlantic Philanthropies. The project forms a flagship project within Louth's age-friendly initiative.

Enhancing the quality of life of older people through the use of cutting edge technology is the primary aim of the Centre for Affective Solutions for Ambient Living Awareness (CASALA), which was established in October 2009 by the Netwell Centre at DkIT.

The Netwell Centre set up an ageing-in-place research project to examine the impact of the housing on older people's quality of life, while CASALA manages the technology, collates the data and adapts the systems to meet the unique needs of individual occupants.

The homes provide improved quality of life through a comfortable, healthy and accessible internal environment, with efficiencies in cost of living and energy provision. The homes incorporate innovative ambient assisted living (AAL) technology and sensors, which provide feedback to residents themselves and will alert carers and friends remotely if and when help is needed.

The Great Northern Haven housing project in Dundalk

The houses have been occupied since May 2010 and the project monitoring structure ensures the delivery of these aims and objectives over time. The project will be monitored over a five-year period so that lessons learned and research findings inform commercialisation of new technologies and inform national policy for services for older people.

The Great Northern Haven project's design and technology is informed by extensive research and consultation with end-users, service providers, key stakeholders and international best practice in the design of homes suitable for ageing well and independent living.

At each stage of design development, the wider environmental and sustainability context was reviewed with those in the fields of occupational therapy, accessible design, sustainable design and innovative technologies to develop new engineering solutions for independent living.

Each home has integrated technology programmed specifically for the resident that facilitates independent living, provides feedback on their health and wellbeing and delivers energy savings such as turning the heat off when a window is opened, warning residents if appliances have been left on and switching lights off with door and presence detectors. A cost benefit analysis of the care model in terms of investment in intelligent housing and savings in the healthcare system is being conducted as part of the research.

The collaborative approach across the lifetime of this project, in particular the strong collaboration between engineering, technology and design demonstrates, not just engineering's contribution to society, but its critical role in delivering new and innovative solutions to social, environmental and economic challenges.

VOTE FOR YOUR FAVOURITE
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Engineering design for assisted living

''Living longer is one of the great successes of our society, with older people contributing positively to the social, economic and cultural life of our communities,'' said Andrew Macfarlane, commercialisation and centre manager at CASALA. ''However, the delivery of suitable care models and housing that can respond to their changing needs presents significant challenges for local authorities and the HSE.

''The Great Northern Haven project aims to demonstrate how integration of excellence in engineering, enabled by new ambient assisted living technology can relieve pressure on the health service and local authority resources while allowing people to live a more fulfilling life within their homes.

''The 16 units incorporate several unique aspects in terms of the architectural design, smart home features and living laboratory infrastructure.

''The smart home features include more than 2,000 sensors, actuators and higher-level alerts. These sensors are in every light switch and thermostat, and include presence sensors in each of the main rooms, as well as electricity sensors, heating and water sensors, outdoor weather sensors and an array of other sensors and detectors.''

Macfarlane said the feature winning most attention was the combination of all these sensors and the ability to record information in collaboration with the older people.

''This forms the living laboratory which has been selected as part of the European living lab network,'' he said. ''The longitudinal data acquired already totals over 100 million records of data, which give powerful information about how older people live and what changes in their health and wellness can be detected by ambient sensors.

''This represents a new standard for building systems. The project is informing a research initiative that includes engineering design innovation and commercial applications. It is the first of its kind in Ireland, and at national and international level is actively being evaluated and viewed by academics, professionals and healthcare providers.''

Macfarlane said the project was unique in Ireland and worldwide. ''The Great Northern Haven project has enormous potential to contribute new learnings and influence future developments that seek to meet some of the challenges that are brought on by the impact of demographic, economic and technology changes.''