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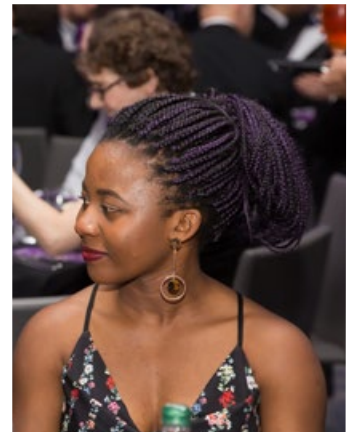


IChemE Global Awards 2018 Review

In association with

Johnson Matthey
Inspiring science, enhancing life

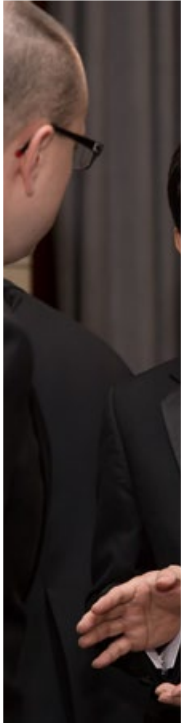




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IChemE Global Awards 2018 Winners





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IChemE Global Awards 2018 Judging Panel



Keith Batchelor –
Chair



Jeremy Black



Nigel Bowker



Grant Campbell



Jamie Cleaver



Rachel Cooke



Richard Drake



Jarka Glassey



Tony Hasting



Julian Hought



Steve Kaye



Jason Leadbitter



Kit Oung



Tom Rogers



Eva Sorensen



Danny van Schie



Mark Thomas



Peter Waite



Colin Webb





Event Partner

Johnson Matthey

Inspiring science, enhancing life

Johnson Matthey is delighted to be the event partner for the IChemE Global Awards this year.

Our vision is for a world that's cleaner and healthier and our science has a global impact. It enables low emission transport, pharmaceuticals, chemical processing efficiently, effectively and sustainably.

Across the world, our technologies already help prevent the emission of 40 tonnes of pollutants entering our air every minute of every day. And we are using our science to develop new technologies, such as battery cathode materials and fuel cell components, to enable the journey to pollution free roads.

Chemical engineering is key to bringing our science to reality. It enables us to collaborate with our customers and partners to make a real difference to the world around us. It is wonderful to see the innovation and collaboration demonstrated in these entries.

Thank you everyone for taking part and sharing your achievements in chemical, biochemical and process engineering. We wish all the finalists the best of luck in these prestigious awards.

www.matthey.com

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Outstanding Achievement

The outstanding entry from the IChemE Global Awards across all categories will receive the Outstanding Achievement in Chemical and Process Engineering Award 2018.

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ExxonMobil

ExxonMobil, the largest publicly traded international oil and gas company, uses technology and innovation to help meet the world's growing energy needs.

We hold an industry-leading inventory of resources and are one of the world's largest integrated refiners, marketers of petroleum products of chemical manufacturers.

We have been operating in the UK since 1888 and have the regional HQ for several international business here. Further to this we have the largest UK refinery at Fawley, plus significant chemical manufacturing across three sites and the UK's largest privately owned pipeline network.

www.exxonmobil.co.uk

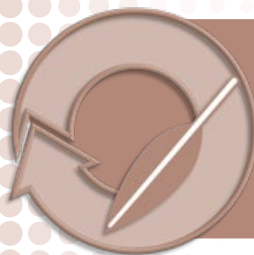
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Outstanding Achievement in Chemical and Process Engineering Award 2018 Winners



Advanced Plasma Power, University College London, Cadent Gas, Progressive Energy, UK *Converting Waste to BioSNG*

This consortium has developed an innovative and highly-competitive process to convert biomass and municipal solid waste into BioSNG, a sustainable, drop-in replacement for natural gas that can be used to heat homes and power heavy-duty vehicles. The patented process design, which has been demonstrated at pilot scale, includes a two-stage gasification process and a simplified catalytic train, which helps maximise yield and minimises residues and effluents from the process. The project led to the realisation of the world's first commercial demonstration plant to produce renewable, low-carbon BioSNG by gasification of household waste.



Biotechnology

Recognises achievement, innovation and discoveries in the fields of biochemical, biomedical, bioprocessing, bioengineering, bioenergy, biocatalysis, bioreactor and nanotechnology.

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WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower.

We are technical experts and strategic advisors including engineers, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, programme and construction management professionals.

With 42,000 talented people in more than 500 offices across 40 countries, we engineer projects that will help societies grow for lifetimes to come.

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Agridon Technologies, Malaysia

Extraction Using Formulation Science-Assisted Processing

Agridon Technologies' optimised herbal-extraction uses formulation science-assisted processing to mitigate postharvest losses. This interdisciplinary value innovation is the key to supporting high-value manufacturing by steering the company's value proposition away from engineering commoditisation as enabled by Alibaba. The latter has severely curtailed SME engineering businesses in Malaysia due to commodity trap.

Agridon Technologies' value proposition allows for more efficient and complete herbal extraction, and preservation of bioactivity, recovering as much as US\$230 of the value lost per kilogram of raw harvest.

Chemical/process engineering is key for moving bio-innovations up the chain of Technology Readiness Level (TRL), especially at TRL 5 and TRL 6.



Centre of Sustainable Palm Oil Research (CESPOR), University of Nottingham, Havys Oil Mill Sdn Bhd., Eureka Synergy Sdn. Bhd., Nottingham Green Technologies Sdn. Bhd., Malaysia

A New Bioreactor for Biogas Production from POME

The Integrated Anaerobic-Aerobic Bioreactor (IAAB) is the only technology on the market that can convert palm oil mill effluent (POME) into high quality biogas and treated water for reuse/recycle simultaneously.

It is a self-sustaining system that produces net energy. It also significantly reduces greenhouse gas emissions as well as the footprint of equipment required by conventional POME treatment.

IAAB began development in University of Nottingham, Malaysia in 2008 at laboratory scale of 60L and now ten years on has achieved pre-commercialised scale of 3,000,000L

This technology has proven the value of close collaboration between government agencies, academia and industry partners.

Enerkem, Canada

From Waste to Biofuels: Enerkem's Disruptive Biotechnology

Enerkem produces advanced biofuels and renewable chemicals from waste. Its disruptive proprietary technology converts non-recyclable, non-compostable municipal solid waste into methanol, ethanol and other widely-used chemicals. Headquartered in Montreal, Canada, Enerkem operates a full-scale commercial facility in Alberta as well as an innovation centre in Quebec. Enerkem's facilities are built as prefabricated systems based on the company's modular manufacturing infrastructure that can be deployed globally.

Enerkem's technology is a prime example of how a true circular economy can be achieved by diversifying the energy mix and by making everyday products greener while offering a smart, sustainable alternative to landfilling and incineration.





Imperial College London, UK

DMSO-Free Preservation of Therapeutic Cells

Several cell-based therapies have won regulatory approval and are regarded as revolutionary in the medical area. For cell therapy to become an affordable, routine clinical reality, preservation of therapeutic cells is required to decouple cell production from final patient delivery.

Cell preservation is traditionally accomplished using a toxic agent, DMSO. Imperial College's patented technology enables: safe and scalable intracellular loading of membrane-impermeable trehalose (non-toxic sugar in freezing/desiccation-tolerant organisms) without causing cell damage; and development of DMSO-free protocols for preservation (eg cryopreservation and desiccation) of cells and tissues. It has huge market potential and important social and economic value.

Mint Innovation, New Zealand

Recovering Gold from Waste Using Microbes

Mint Innovation is pioneering a world-first biometallurgical process that combines chemistry, microbiology and process engineering to recover valuable metals from electronic waste. The process leverages evolved microbial traits to concentrate noble metals by several orders of magnitude from a mixture of base metals. Mint's objective will be reached through the deployment of low-cost, scalable local facilities that can process a city's e-waste stream – turning waste into a sustainable metal supply, creating a closed loop and kick-starting the circular economy.

Monash University, Australia

Collaborative Food and Dairy Research

Building on a world-first microfluidic spray-drying technology (used to create, for example, milk powders), the Monash Program of Collaborative Research for the Food & Dairy Industry has enabled its commercial partners – a group which processes >70% of Australia's milk – to more precisely predict and control processing outcomes, improving energy efficiency and reducing waste.

Joining forces with research partners across the globe, particularly in China where demand in the food and dairy sector is booming, this large-scale internationally collaborative research program is revolutionising the industry.

The Program also strengthens industry workforces by training industry-ready postgraduates and linking them with partners.

University of Oxford, UK

Engineered 3D-Microtumours for Personalised Cancer Therapy

The estimated annual cost of ineffective cancer treatment in the US alone is US\$350bn. Therefore, the efficient production of realistic human tumour-mimics is of enormous potential importance for testing drug efficacy, tackling ethical issues concerning the use of animals and in reducing the costs of chemotherapeutic development.

The University of Oxford has employed a new microfluidic strategy to engineer uniform 3D-microtumours from human cancer cells at a production-rate of 1000 /hour for drug testing. The approach enables the incorporation of tumour matrix, closely resembling the tumour-microenvironment. This research is a significant step towards making personalised cancer therapy accessible to all.

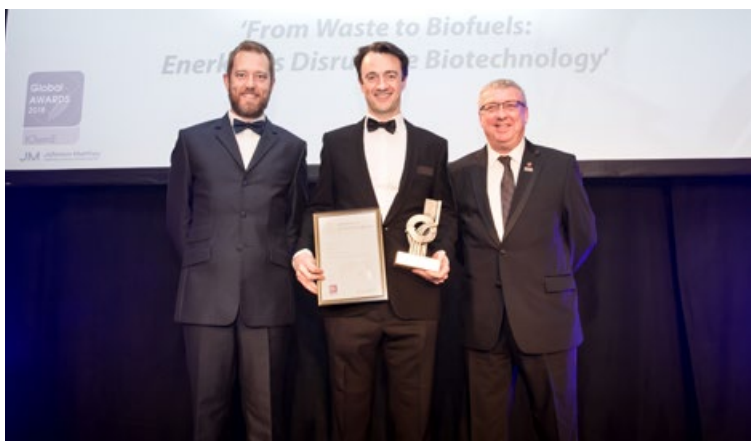
Universiti Teknologi Malaysia, Malaysia

MiFGROW

Universiti Teknologi Malaysia has developed a microcapsule to improve the survivability of probiotics added to animal feed.

The most common factor affecting the loss of probiotics added to animal feed is the high temperatures used during the storage or pelleting process. This research has showed that agricultural waste, especially fibre and polysaccharide biomaterial, can be used to produce heat-resistant microcapsules that insulate probiotics.

Probiotics that survive in animal feed would enhance microbial performance, improving feed use, animal production and health. Consequently, the agro-farming sector would benefit in terms of cost reduction, profit and corporate social responsibility.





Business Start-Up

Recognises the top organisation, within or serving the chemical, biochemical and process industries, to be formed in the last five years.

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Bouygues Energies & Services offer turnkey design, build, operate and maintain solutions for highly demanding and technically challenging projects. By maintaining a focus on sustainability and energy efficiency, we enhance our clients' long-term business outcomes, with integrated capabilities which span the entire project lifecycle. This, alongside a highly experienced consultancy team, means that we can take on a great variety of challenging and complex projects in vastly different industries.

This seamless approach which encompasses technical and professional services, creates added value from day one, ensuring the accelerated delivery of our client's strategic vision.

www.bouygues-es.co.uk

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Green Lizard Technologies, UK

GLT's Journey from Creation to Commercialisation

Green Lizard Technologies (GLT) is a spin-out company with expertise in the chemical, energy, and recycling industries. It applies a distinctive problem-solving capability to develop a succession of defensible technologies that are differentiated by virtue of being 'cheaper, greener, cleaner, and safer'. Each technology is specifically designed to address large and impactful market opportunities. GLT has a proven track record of taking technologies from bench to pilot to commercial scale using a unique fast-track methodology. GLT is fast building an excellent reputation along with international consortia tackling many environmental and societal problems, such as emissions reduction and plastics recycling.



Mint Innovation, New Zealand

Recovering Gold from Waste Using Microbes

Mint Innovation is pioneering a world-first biometallurgical process that combines chemistry, microbiology and process engineering to recover valuable metals from electronic waste. The process leverages evolved microbial traits to concentrate noble metals by several orders of magnitude from a mixture of base metals. Mint's objective will be reached through the deployment of low-cost, scalable local facilities that can process a city's e-waste stream – turning waste into a sustainable metal supply, creating a closed loop and kick-starting the circular economy.



MKPro Engineering, Australia

Start-Up Award: MKPro Engineering

MKPro Engineering Pty Ltd deploys its resources (including its patents) to help its clients to sustainably reduce their overall costs while achieving desirable process outcomes, speed to market and quality products, without compromising on social responsibilities. It develops its employees to become leaders of the community and society and to use their technical and management skills to solve practical engineering problems and any social issues that may be associated with those problems.





Diversity and Inclusion

Recognises the organisation or group that best demonstrates a commitment to promoting diversity and inclusion* within its workforce, sector or business practises.

**Diversity means respecting and valuing all forms of difference in individuals. Inclusion is about positively acknowledging this diversity and taking deliberate action to create environments where everyone feels respected and able to achieve their full potential*

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BP are a global energy business, involved in every aspect of the complex energy system that drives our world.

We operate in 72 countries and employ around 75,000 people worldwide. From the deep sea to the desert, from rigs to retail sites and research centres, we deliver energy products and services to people around the world. We also provide customers with fuel for transport, energy for heat and light, lubricants to keep engines moving and the petrochemicals products used to make everyday items as diverse as paints, clothes and packaging.

We track, trade and deliver the world's energy in real time.

www.bp.com

Atkins (SNC Lavalin Group), UK

Creating Inclusive Cultures and Diverse Teams

As an engineering consultancy, people are at the heart of Atkins' business. The focus over the last few years has been how it helps companies attract, engage and retain individuals.

The strength-based programme used within some of Atkins' teams, works on tapping into individuality to help people be at their best and feel fulfilled and engaged. Initial evaluation indicated an 18% improvement in team members' perception of the team, after three months of the programme.

Atkins' engagement with the wider public focuses on demonstrating a career in engineering as visionary and exciting – promoting that engineers are needed more than ever before.

Environment Agency, UK

Diversity: It's In Our Nature

The Environment Agency aims to create a "life-enhancing" working environment that values and embraces difference. It fosters an inclusive workplace culture where colleagues from all backgrounds can bring their whole self to work, progress their career, and feel their uniqueness is valued. The company aims to create a diverse workforce that reflects the communities that it serves by being visible and engaging with its communities.

ExxonMobil Chemical, UK

Fife Ethylene Plant – People's Interest Network

At ExxonMobil's Fife Ethylene Plant, the People's Interest Network (PIN) is a volunteer initiative, encouraging and developing a work environment where people respect and maximise the value of individual thoughts, skills, knowledge and cultures. By unleashing the potential of a diverse workforce, it can lead to superior business results. This is being achieved through visible leadership, mentoring, and networking opportunities to support the professional advancement and personal growth of an inclusive and diverse workforce.

Launched in 2017, PIN has organised over 40 events on-site and off-site, engaging 90% of employees through highly visible and impactful promotion of inclusion and diversity.

GHD, Australia

A Diverse Team Delivering Diverse Projects

The Risk Management team at GHD Advisory works together to celebrate difference and champion gender balance in the engineering consulting sector.

The team has been able to achieve an equal mix of genders, integrate multiple nationalities, speak different languages and support individuality through mentoring and flexible working hours.

The team believes that diversity and inclusion is less about meeting company targets – it's more about high quality outcomes, which is achieved together as a more diverse team. Having a breadth of experience and perspectives allows GHD to add value to an increasingly diverse client base and better connect with wider society.



Imperial College London, UK

Imperial Chem Eng, Living Our Values

The Department of Chemical Engineering at Imperial College London has been committed to supporting gender equality for nearly a decade. It has focussed on diversity and inclusion for staff and students, who represent over 40 different nationalities and a diverse range of cultural backgrounds.

It has introduced a scholarship scheme for attracting talented postgraduate students regardless of their financial status; recognised the achievements of students and staff through internal and external award schemes; and introduced various outreach activities in schools and on social media, publicising positive role models.

It has also established a university-wide group that supports and promotes women working in science, technology, engineering and mathematics, and plans to launch a scholarship scheme for undergraduate students from disadvantaged backgrounds.

Infineum, UK

Improving Inclusiveness and Diversity at Infineum

Infineum recognises the value of a diverse and inclusive workforce. Inclusiveness and diversity are fundamental to its business strategy and intrinsic to the company's core value of 'Respect for individuals'. Infineum believes an inclusive environment enhances its ability to succeed in all areas of operations.

It is actively working to achieve a more inclusive culture, which leverages the full capabilities of every employee globally. This starts with a compelling vision from the CEO, and includes regular staff training, updated processes and strong management accountability.

This is making a difference for employees and the communities where Infineum is located.



InterEngineering, UK

Connecting, Informing and Empowering LGBT+ Community

InterEngineering is a free and inclusive organisation for everyone who believes that LGBT+ diversity and inclusion within engineering is important.

It has regional groups all over the UK and are aiming to have complete UK coverage by 2020.

Its Mission: To connect, inform and empower LGBT+ engineers and their support to foster greater inclusion in engineering.

Its Vision: To be the leading LGBT+ organisation catalysing change and fostering greater inclusion in engineering by working with engineering companies, institutes, government and future talent pipeline.



Rolls-Royce, UK

Inclusive Engineering for the LGBT+ Community

Prism is an Employee Resource group of Rolls-Royce, founded in 2015. Prism aims to make the workplace a place where the company's LGBT+ employees can be themselves. It has now grown to over 700 members, which includes people who identify as LGBT+, as well as non-LGBT+ allies.

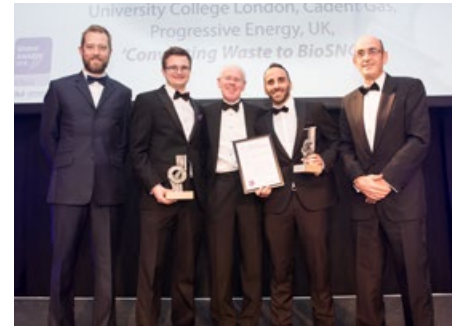
The Prism vision is one of connecting, encouraging and developing diverse people to drive innovation, attract and promote talent, and to support global growth. Within a short space of time, Prism has made a significant impact within the company, and engineering more broadly, to address the issues of LGBT+ engineers in the workplace.





Energy

Recognises the best project or process to demonstrate innovation in renewable, alternative or nuclear energy, efficient energy use or the development of energy production methods that reduce energy intensity.



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Rolls-Royce®

Rolls-Royce designs, develops, manufactures and services integrated power systems for use in the air, on land and at sea. Our products include gas turbines, reciprocating engines and nuclear steam raising plants.

For 55 years, we have been designing and manufacturing the reactors that power the Royal Navy's fleet of nuclear submarines. We are also providing engineering services and solutions to around half of the world's operational nuclear reactors, supporting clean and efficient power generation.

Our highly skilled engineers are driven by our aspiration to provide better power for a changing world.

www.rolls-royce.com

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Advanced Plasma Power, University College London, Cadent Gas, Progressive Energy, UK

Converting Waste to BioSNG

This consortium has developed an innovative and highly-competitive process to convert biomass and municipal solid waste into BioSNG, a sustainable, drop-in replacement for natural gas that can be used to heat homes and power heavy-duty vehicles. The patented process design, which has been demonstrated at pilot scale, includes a two-stage gasification process and a simplified catalytic train, which helps maximise yield and minimises residues and effluents from the process. The project led to the realisation of the world's first commercial demonstration plant to produce renewable, low-carbon BioSNG by gasification of household waste.

Dow Silicones, Belgium

Low Thermal Conductivity Insulating Glass Sealant

DOWSIL™ 3364 Warm Edge IG Sealant is engineered as a low thermal conductivity material for use as a secondary seal for double and triple gas-filled insulating glass. Its unmatched thermal conductivity, which is approximately 45% lower than conventional silicone sealants, enables significant energy savings in buildings. It combines low conductivity with high strength which enables its commercial use in line with stringent building regulations. Altogether, DOWSIL™ 3364 enables the design of energy-efficient buildings while maintaining façade durability and longevity.



Hong Kong Productivity Council, China

Food Waste Total Recycling Process

Hong Kong Productivity Council has developed a novel zero-effluent discharge process with specialised microbes to convert food wastes into valuable products, including high purity biogas (~80% methane), protein-rich eco fish feed and oil for biodiesel production. The invention helps solve food waste disposal problem, recover valuable resources, generate renewable energy and reduce carbon emission. It can be applied as a network of decentralised systems to recycle food waste. Besides biogas as important renewable energy, fish feed produced can support local fish farming to form a low-carbon food system in urban cities. A pilot plant has been built to demonstrate the technology.



Imperial College London, UK

Next-Generation Hybrid Solar Systems

The Clean Energy Processes (CEP) Lab at Imperial College has developed a novel integrated PV and solar-thermal (PVT) hybrid panel technology that breaks entirely from the optical and thermal design principles employed in all current PVT panels.

The technology can deliver up to 3–4 times more useful energy (electricity plus heat) than standard PV panels and up to 1.5–2 times more energy than conventional hybrid PVT panels from the same area. It is also cost-competitive with low-cost/low-end panels.

A patent has been filed and the CEP Lab is now working with spin-out company Solar Flow, investors and original equipment manufacturers on a full-scale demonstration project funded by the Department for Business, Energy and Industrial Strategy.

National Energy Technology Laboratory, US

Mixed Slag Converts Wastes to Fuels

The mixed slag technology developed at the National Energy Technology Laboratory converts waste by-products (solid slags and CO₂ emissions) at the source of steelmaking and power-generation industries to produce value-added fuels through an innovative chemical process. The fuels produced using this novel slag mixing technology can be used for additional power generation or other beneficial processes, thereby enhancing efficiency, cutting costs, and reducing the environmental impact of industrial operations.



Food and Drink

Recognises the best project, process or product that demonstrates innovation to optimise manufacturing operations and contribute to the manufacturing of safe, sustainable food or drink.

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Founded in 1990 with a vision to create a 'one stop shop' for totally engineered solutions, adi Group is a large multi-disciplined engineering firm delivering solutions across more than 30 specialist divisions and engineering disciplines.

Operating from 11 regional bases in the UK and Ireland and with over 600 employees, we are the engineering partner of choice to many of the world's largest manufacturers in the aerospace, automotive, food & beverage, manufacturing, petro-chemical, and pharmaceutical industries.

We specialise in project delivery in live manufacturing, food safety critical and sensitive working environments typically completing in excess of 5,000 projects per annum.

www.adiltd.co.uk



Monash University, Australia

Collaborative Food and Dairy Research

Building on a world-first microfluidic spray-drying technology (used to create, for example, milk powders), the Monash Program of Collaborative Research for the Food & Dairy Industry has enabled its commercial partners – a group which processes >70% of Australia's milk – to more precisely predict and control processing outcomes, improving energy efficiency and reducing waste.

Joining forces with research partners across the globe, particularly in China where demand in the food and dairy sector is booming, this large-scale internationally collaborative research program is revolutionising the industry.

The Program also strengthens industry workforces by training industry-ready postgraduates and linking them with partners.



WSP and Quorn Foods, UK

Belasis Quorn Production Facility

The new Belasis Quorn production facility will enable Marlow Foods to meet growing demand for Quorn – the meat-free, sustainable source of protein that's becoming more and more popular across the UK and beyond.

Thanks to an innovative three-storey structure, the brand-new harvesting and forming facility, which includes a water treatment plant, fits efficiently into a small site footprint. By collaborating across disciplines the project team were able to meet the demands of the unique production process, keep costs down, ensure process safety and complete the work on time.





Industry Project

Recognises the best chemical or biochemical engineering project to be implemented in industry after 1 July 2015.

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Sellafield Ltd is the company responsible for the safe and secure management of the operational and legacy nuclear facilities at Sellafield in West Cumbria. This is undertaken on behalf of the Nuclear Decommissioning Authority dealing with UK's nuclear legacy, fuel recycling and the management of low, intermediate and high level nuclear waste activities.

Engineering, design and functional support capability are provided by employees based at the Risley office, near Warrington.

Sellafield is nearly 80 years in the making, covers 6 square kilometres and is home to more than 200 nuclear facilities.

The company is transforming as the mission changes with the cessation of reprocessing operations.

www.sellafieldsites.com

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BPE Design and Support and GSK, UK

Elemental Digitised Process Engineering Design

BPE and GSK have worked together to develop an innovative approach to the design of new process plants based on modular standardisation.

The project approach realises significant benefits in terms of design optimisation, simplicity and repeatability.

A classification system allows modules of different complexity and scale to be stored in design libraries so that they can be applied securely on future projects.

Johnson Matthey, UK

Buprenorphine Recovery Process

The Johnson Matthey team has developed a recovery process, by repurposing and modernising an outdated facility. The team ensured it met all current process safety and environmental concerns in a short period of time to deliver products that meet a society need, whilst also adopting robust processes to ensure successful return of investment for Johnson Matthey.

Lehigh Technologies and Michelin, US

Making Tire Production Fully Circular

Lehigh produces a highly engineered, versatile raw material called micronized rubber powder (MRP) from end-of-life tires. MRP is a low-cost, high-performance, sustainable raw material that can substitute for other oil and rubber-based materials used in manufacturing tires, plastics, asphalt and construction materials.

In 2017, Lehigh was acquired by the tire manufacturer Michelin to build on its 4R strategy of reducing, reusing, recycling, and renewing across its global product lines. This strategic acquisition demonstrates Michelin's commitment to ambitious tire recycling and renewable materials goals by 2048 and to further Lehigh's mission of developing new markets for MRP.

Rolls-Royce, UK

Delivering a New Nuclear Manufacturing Facility

Rolls-Royce has successfully designed and constructed a new, highly complex, manufacturing facility for its Raynesway site. The new facility replaces the existing, ageing plant and secures the company's ability to deliver on customer commitments, now and in the future.

Rolls-Royce created a collaborative environment enabling the project team to manage interactions between the customer, contract organisations and regulatory bodies. The project followed strict engineering controls to ensure the design met regulatory requirements, as well as operational targets.

In delivering this project, Rolls-Royce has demonstrated its ability to manage a complex engineering project in tight timescales and a challenging economic climate.





Sellafield Ltd, UK

Working Together to Commission Evaporator D

The Evaporator D facility replaces the existing evaporator fleet at the Sellafield site in support of an evolving mission including end-of-life reprocessing operations and high hazard reduction. It incorporates new technology to allow processing of solids-bearing radioactive liquors as part of Sellafield's decommissioning strategy.

Bringing Evaporator D into active service represents the most significant, high profile engineering project for the UK's nuclear industry in current times. The performance of the team and resilience shown whilst faced with significant challenges has been outstanding.

Resolution of fundamental design issues ensured the evaporator entered active operation without incident, and in time, to safeguard hazard reduction and operational programmes.



University of Malaya and Berqat Mechanic Engineering, Malaysia

Self-Cleaning Ultrafiltration System Producing Clean Water

This project involves the development of an automated self-cleaning mobile ultrafiltration system to produce clean water from various sources, including river water, underground water and spring water.

It incorporates a self-cleaning smart backwash system eliminating the use of chemicals. It can also be driven by solar power and can be easily transported to rural areas whenever needed. It is a green system with high socio-economic impact addressing clean water security goal (SDG6). The system has been installed in many remote villages in Malaysia and can produce clean water at a cost less than MYR 0.20 (£0.10) per m³.



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**200 years of
inspiring science
and enhancing life**

Johnson Matthey
Inspiring science, enhancing life

At Johnson Matthey our vision is for a world that's cleaner and healthier. Our scientists and engineers work every day developing innovative products that provide cleaner air, improved health and enable more efficient use of natural resources. As a global leader in sustainable technologies we work with our customers across markets from pharmaceutical and medical to automotive, industrial and chemical production, optimising processes and improving efficiency. Our solutions continue to evolve with the changing demands of our time as we tackle new challenges to build a cleaner and healthier future for generations to come.

To find out more visit [matthey.com](https://www.matthey.com)



Innovative Product

Recognises the best product originating from the process industries to be manufactured commercially after July 2015. The product should demonstrate innovation, and a social, commercial, safety and/or environmental benefit.

Sponsored by

Loss Prevention Bulletin

The Loss Prevention Bulletin is the leading source of process safety case studies. It was first published in 1974 in response to the disastrous explosion at Flixborough; its aim was to provide a way for the process industries to share information on accidents with the intention that other organisations could learn the same process safety lessons without repeating the same mistakes. It now has an archive spanning over 40 years and covers both major accidents such as Bhopal, Piper Alpha and Texas City. But also, and perhaps more importantly, less well-known incidents and near-misses whose details are not widely available elsewhere.

www.icheme.org/lpb



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Dow, US

EVOLV3D™ Universal Support Material

3D printing has great potential to change the way the world manufactures products, and the continued development of novel materials will be vital to the industry to reach that potential.

Support materials enable the manufacture of complex part in filament printing; and the EVOLV3D™ Universal Support Material is an exceptional choice of support that is non-hazardous, easy to use, easily removed, and easily disposed of.

It is compatible with many build materials and requires no special chemicals to remove allowing for innovators in academic or commercial settings to create new, useful parts via the breakthrough technology that is 3D printing.

Dow Performance Silicones, US

First Jet-Dispensable Moisture-Reactive Silicone Hot-Melt Adhesive

Dow Performance Silicones' EA-4600 LV is an advanced silicone hot-melt adhesive adding post-application curing. It combines the benefits of hot-melt adhesives, including rapid dispensing by elevating the temperature and green strength upon cooling, with a moisture reactive cure system to cross-link.

The result is a hot-melt adhesive that, once cured, cannot melt again. Green strength develops rapidly as viscosity increases upon cooling, allowing advancements in manufacturing productivity and providing unmatched working and reparability times. It provides instant, primerless adhesion to a wide variety of substrates. After curing, EA-4600 LV provides unmatched silicones performance for durability, resilience, water stability and more.

Johnson Matthey and Avon Protection, UK

Escape Hood with Carbon Monoxide Oxidation Capability

Johnson Matthey and Avon Protection have leveraged their combined skills in safe catalyst development and product innovation to develop the NH15 COMBO escape hood. This portable mask provides first responders over 15 minutes of protection from exposure to smoke, chemical, biological, radiological and nuclear threats and life-threatening levels of carbon monoxide (specifically, a concentration level of 3600 parts per million).

This mask can be put on in less than 30 seconds and will provide sufficient protection to save the life of the wearer.

Micropore Technologies, UK

Monodisperse Particle and Emulsion Manufacturing Equipment

Micropore, a specialist engineering company, has broken through a long-established barrier to enable its clients to unlock commercial scale manufacture of monodisperse particles and emulsions. Micropore's equipment spans early laboratory scale through to robust equipment with multi kiloton capacity.

Applications range from pharma, personal care, industrial applications and even rocket fuel. Clients have reported ubiquitous benefits, including significant reductions in waste and reduced energy consumption, as well as many sector specific benefits – all of which are significant contributions to sustainable development in formulation.

National University of Singapore (NUS), Singapore

Compressor-Less, Chemical-Free, Energy-Efficient Air-Conditioners

Air conditioners haven't changed since their invention in 1902. They employ compressors, circulate refrigerants, and release heat outside as they cool buildings.

NUS engineered a remarkable new air conditioner that uses no chlorofluorocarbons (CFCs) and a fraction of the energy compared to a traditional system. Additionally, it produces purified drinking water when used outdoors.

Air is first passed over membranes to be dehumidified. The dry air is then flowed through multiple pairs of wet/dry channels to be cooled. This cooling method ensures that the rejected waste air is also cooled and doesn't create the heated microclimates found outside traditional air conditioners.

ProHeat Systems and SGN, UK

Unlocking Efficiency in Indirect Fired Heaters

ProHeat Systems has successfully commercialised a heat transfer technology based on thermosyphon technology, which adapts easily to changes in demand.

A common problem in industry is managing the supply and demand for energy in heat transfer processes. A large proportion of heating technologies are based on hot water which cannot adjust to changing demand, often resulting in over-delivery of heat.

The indirect heating technology introduced by ProHeat Systems improves the balance between supply and demand by using the energy absorbed and delivered from change of phase from steam to water, providing precise control, while reducing overheating and improving energy performance.

Stora Enso, Finland

Renewable Lignin Replaces Fossil-Based Materials

Traditionally discarded by the pulp and paper industry, Stora Enso has been focusing on repurposing lignin, a versatile raw material which can replace fossil-based materials in a range of applications.

Lineo™ by Stora Enso is a more sustainable, non-toxic alternative launched earlier this year and it is already replacing phenols in coatings and adhesives.

This is an important step on the way to replacing fossil-based materials with renewable solutions and the innovative product is available to any company seeking more sustainable, bio-based alternatives. In the future, Lineo™ could also be developed into carbon fibre and material for energy storage applications.



IChemE

Vecor, China and DJS Process Consulting, UK

Grey to Green – Systema Leonardo

Systema Leonardo is an innovative process engineering solution to the world's largest industrial solid waste problem – fly ash waste from power stations. Over 300 million tons of fly ash waste are dumped in ponds annually.

Systema Leonardo was born from a combination of innovative research at the University of New South Wales, combined with the vision and chemical engineering expertise of Vecor.

Vecor translated the research into a practical and economic manufacturing process using ash as a major component in the production of ceramic tiles at lower cost, lower carbon footprint and with superior properties, compared to tiles from the conventional process.



WorleyParsons, Australia, Reactor Services International, US, and Mecfor, Canada

CAROL (Catalyst Removal Amphirol)

Safety. Quality. Efficiency. Advisian Digital's CAROL (Catalyst Removal Amphirol) achieves all these. It is the industry's first commercial robot for catalyst unloading from refinery and petrochemical vessels. It has the potential to change the way this currently risky process – involving people inside vessels – is performed globally.

The idea was generated and incubated through the WorleyParsons Innovation Process and developed with partners through their Project Management Office.

The first commercial field trial was conducted at an Australian LNG plant where CAROL successfully removed the molecular sieve catalyst (more than 50m³) from a dehydration vessel and avoided confined space entry.

CAROL saves lives.





Oil and Gas

Recognises the best project or process to demonstrate innovation in the oil and gas sector, efficient energy use or the development of energy production methods that reduce energy intensity.



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We offer global expertise within the energy, chemicals and resources line of business to help clients develop, build and maintain technically complex facilities across the chemicals, upstream/midstream oil and gas, refining, mining and minerals and renewable energy sectors.

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ExxonMobil, UK

ExxonMobil Global Mobile Inspection App

An Inspection Application for use with iPads that was conceived and developed at the ExxonMobil Fawley site is set to change the way that visual inspections of fixed equipment such as pipework, heat exchangers and towers are completed across the global ExxonMobil network of manufacturing sites.

The Global Inspection Mobile App (GIMA) will not only make this vital process less time consuming and more accurate, it will also bring significant costs savings to the corporation. The idea for the app was generated and developed at Fawley, and is currently being rolled out across the globe.



Johnson Matthey, UK

CATACEL SSR: Structured Steam Reforming Catalyst

CATACEL SSR is a coated, metal-foil-based, engineered alternative to the catalyst-impregnated ceramic pellet used in steam methane reforming.

For many years, the pellet has driven reforming reactions in hydrogen, methanol and ammonia plants. Catalyst design is a balance between many competing requirements such as strength, heat transfer, activity and pressure drop.

The engineered structure of CATACEL SSR enables it to stretch many of the limitations imposed by the use of ceramic pellets. It exhibits higher activity, improved heat transfer, and lower pressure drop all at the same time.



NGLTech and Vestigo Petroleum, Malaysia

Low-Pressure Condensate Recovery (LP-CRS) System

LP-CRS is the only technology currently able to extract valuable hydrocarbon condensates effectively from a very low-pressure gas, including flare gas, in a compact, self-contained unit. This boosts revenue by increasing crude production that would otherwise be flared and reduces greenhouse gas emissions by up to 30%.

The technology received good recognition from many operators around the world and picked up the Spotlight on New Technology Small Business Award during the recent Offshore Technology Conference (OTC) Asia 2018. The first commercial unit has been successfully installed and is currently operating on the MaMPU-1 floater in the Anjung Kecil Field.



Northern Gas Networks, UK

The H21 Project

The H21 concept seeks to convert the UK gas distribution network to 100% hydrogen over time, thereby decarbonising heat and supporting the decarbonisation of energy generation, large industry and transport. This would be achieved using technology available across the world today while maintaining in the energy mix the benefits of gas and the gas networks for the long-term future. If undertaken such a conversion to hydrogen would represent the single biggest contribution to meeting climate change obligations.

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Pharma

Recognises the best project, process or technology demonstrating chemical engineering excellence in the pharmaceutical sector. The scope covers all development phases (research to supply), types of processes and designs (API, biopharm, sterile manufacture, clean services, SIP/CIP, OSD, biological and high potency containment), and products (from dose forms to medical devices).

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PM Group is an international project delivery company operating across Europe, the USA and Asia. We have a 45-year track record in project management, process design, facility design and construction management for leading multinational companies.

We are world leaders in the pharmaceutical, food, mission critical, medtech, advanced manufacturing and energy sectors. Our reputation is built on great people with a flexible 'can do' attitude who consistently deliver successful projects safely for our clients.

We pride ourselves on our technical expertise and work closely with our clients to develop innovative solutions for complex projects.

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American University of Sharjah, United Arab Emirates

Acoustically-Triggered Nano Vehicles in Cancer Treatment

Chemotherapy is extensively used in the fight against malignant neoplasms. Unfortunately, chemotherapy has numerous side effects, caused primarily because of the non-specific nature of the treatment since the drug is capable of killing normal and cancerous cells alike.

In this research, the team has been investigating the use of nano-sized carriers capable of sequestering chemotherapeutic agents until they reach the tumours.

Once at the desired location, ultrasound is applied to release the chemotherapy drug directly to the cancer site, thus avoiding any interaction with the healthy cells in the body, and minimising the adverse side effects of chemotherapy.



AstraZeneca, UK

Accelerated Drug Launch

The approval process for new drugs can take a significant amount of time. When a new medicine is developed that addresses an unmet need, regulatory bodies can grant breakthrough designation and accelerate the review process. When this happens, a pharma company is expected to pull out all the stops to ensure the approval process and subsequent launch runs smoothly.

When one such drug was developed at AstraZeneca's Macclesfield site, a team was asked to produce material for launch in the pilot plant. The accelerated project condensed five years of process development into 18 months. The project was a success with 12 'right first time' commercial batches produced. This compared to previous production, when 17 out of 18 batches had to be reworked or destroyed.



GSK, PM Group, Suncombe and ITT, UK

Fully Integrated Sterile Filtration Unit

Filter Integrity testing typically involves a number of manual operations (moving filters, connecting pipework and so forth) and relies on a path to atmosphere to allow integrity to be tested. This project aimed to optimise the filtration process and eliminate risks involved with manual operations, and potential routes for contamination, to allow sterile filters to be operated and integrity tested with no quality risks.

Therefore, we have designed a fully automated, fully clean-in-place (CIP) and sterilise-in-place (SIPable), sterile filtration unit, with hard-piped, in-situ integrity testing, with no potential routes for contamination during post-sterilisation, pre-use, integrity testing. Only the filter change element is a manual operation.

Johnson Matthey, UK

Buprenorphine Recovery Process

The Johnson Matthey team has developed a recovery process, by repurposing and modernising an outdated facility. The team ensured it met all current process safety and environmental concerns in a short period of time to deliver products that meet a society need, whilst also adopting robust processes to ensure successful return of investment for Johnson Matthey.



Micropore Technologies, UK

Monodisperse Particle and Emulsion Manufacturing Equipment

Micropore, a specialist engineering company, has broken through a long-established barrier to enable its clients to unlock commercial scale manufacture of monodisperse particles and emulsions. Micropore's equipment spans early laboratory scale through to robust equipment with multi kiloton capacity.

Applications range from pharma, personal care, industrial applications and even rocket fuel. Clients have reported ubiquitous benefits, including significant reductions in waste and reduced energy consumption, as well as many sector specific benefits – all of which are significant contributions to sustainable development in formulation.

North Carolina State University, US

Illuminated Route to Self-Sterilising Surfaces

Worldwide proliferation of antibiotic-resistant bacteria and harmful viruses increasingly worries the healthcare industry and general public. Instead of relying on post-infection treatments, this research has developed an effective and comprehensive antimicrobial strategy. Incorporation of a photosensitive molecule into a polymer matrix yields solution/melt-processable materials that generate singlet oxygen upon exposure to visible light.

Due to its inherently reactive nature, singlet oxygen serves as an efficient antimicrobial capable of inactivating over 99.9% of the bacteria and virus strains tested. This self-sterilization approach is safe and sustainable, requiring only oxygen and light, and pathogens cannot become resistant because singlet oxygen is non-specific.



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In association with the Mary Kay O'Connor Process Safety Center

22–24 May 2019, Birmingham, UK

Join us at our annual process safety conference.

Hazards 29 will share good practice, latest developments and lessons learned in process safety, promoting a continuous focus on safer operations and helping to make good practice common practice.

Covering every major aspect of process safety, it will bring together hundreds of practitioners from around the globe, keen to learn from others' experiences, stay up-to-date with good practice, and network with their peers.

Sponsorship and exhibition packages are available.

Find out more: www.icheme.org/hazards29



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Process Safety

Recognises an organisation that has an exemplary record in implementing process safety best practice and improvements to reduce major hazards and risks.



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Minimizing risk. Maximizing potential.®

ioMosaic is an ISO 9001:2015 QMS certified process safety and risk management firm which focuses on managing and reducing episodic risk. Our expertise encompasses many areas, including pressure relief systems design, process safety management, expert litigation support, training, world class software development and ISO accredited laboratory services.

Our 300+ years of industry expertise allow us the flexibility, resources and capabilities to determine exactly what our clients need to reduce and manage episodic risk, maintain compliance and prevent injuries and catastrophic incidents.

Our mission is to help you protect your people, plant, stakeholders, and our planet.

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AstraZeneca, UK

Early Identification and Screening of Explosive Compounds

As soon as a chemist initiates the process design stage within their electronic notebook, this project automatically identifies potentially-explosive compounds based on their chemical structure.

It defines the process of safe handling potentially-explosive compounds in order to produce the required quantity for a risk-based testing regime.

The rapid and effective identification of the risks at early stages of the development process, using only limited quantities of material allows chemists to handle compounds safely at the design stage as well as enabling inherent safety to be built into the process design enforcing the hierarchy of control.

Chemical Industries Association, UK

CIA Process Safety Network

The Chemical Industries Association's (CIA) Process Safety Network provides an effective solution for sharing on process safety issues – both safety barriers and incident/near-miss learning. 30 UK chemical or pharmaceutical companies are represented by their Process Safety Leads on this Network. It provides a rare opportunity to probe detailed incident investigation findings with people who have first-hand knowledge.

Company representatives can take the site learnings back to their organisations to further leverage the benefit. In this way, overall competencies are continually improved, performance standards are raised, and process safety risk is continually reduced for the benefit of everyone.



Esso Petroleum Company (ExxonMobil), UK

ExxonMobil's Fired-Heater Critical Operating Parameters

Critical Operating Parameters (COPs) for fired heaters is a control scheme logic that significantly reduces the likelihood of a process safety incident due to excessive fuel build up within a heater.

COPs provides the console operator with a simple layout of the heater, with key safety related parameters, and directly uses that information to guide the operator on his/her response, logically and quickly.

Console operator feedback has been excellent and there has been significant positive recognition from senior management for this activity.



Fluor, UK

Absorption Technology for Ultra-Sour Gas

Fluor's patent-pending, two-stage absorption innovation radically improves the efficiency, safety, quality and cost of treating ultra-sour gas, which contains high levels of hydrogen sulfide and carbon dioxide (acid gases). A low-pressure stage provides bulk removal of acid gas in an amine-solvent-based absorber column.

This is followed by a high-pressure polishing stage which removes mercaptans and further removes acid gas to meet product specifications. This method of mercaptan removal potentially eliminates the need for downstream equipment and reduces facility CAPEX and OPEX. Extensive simulations have demonstrated that a safer, high quality product is achieved compared to conventional treatment of ultra-sour gas.

PETRONAS, Malaysia

Plant Instrumentation Process Safety Management Excellence

Non-compliance to IEC61511 Functional Safety – Safety Instrumented Systems for the Process Industry Sector can lead to process safety incidents.

History repeats itself. The high-profile Buncefield spill and explosion that occurred in the UK in 2005 was followed four years later by the Caribbean Petroleum Corporation oil refinery (CAPECO) explosion. Both were due to common issues: failure of the overfill protection system, which forms part of the important Safety Instrumented Function (SIF).

PETRONAS has established a SIF framework and SIL Study Roadmap that eliminates the possible dangerous failure on demand. This enables savings of US\$100,000 to more than US\$10m depending on the severity to people's safety, the environment and production loss.

Sellafield Ltd, UK

Dynamic Digital Twin

Sellafield Ltd has created an agile, innovative tool to improve data management and analysis. It provides fast and easy data entry; controlled access; real time and future plant performance trending; and a web-based platform for cross-site access.

For an investment of about £100,000, the data tool will provide returns of about £6m to £8m for the first plant that has adopted it. The model can be adopted by any plant on site to manage and analyse any sample data (solid, liquor, gases) for further gains and provides the first step towards real-time flowsheeting. Reducing delays saves significant costs.

Sellafield Ltd, UK

“Must Do Something – Can't Do Anything – Have Done Something!”

Chemical engineers at Sellafield Ltd led a multi-disciplinary team that developed and exploited technical knowledge allowing cautious steps to be taken out of the typical 'nuclear safety comfort zone' into a more fit-for-purpose zone that enables faster delivery of a high-hazard reduction mission.

The team rose to the challenge. Using a multi-disciplinary approach, it analysed complex inventory and fire behaviour to develop a nuclear safety case with a less onerous, more flexible and targeted inerting regime that is accepted as an ALARP approach to risk reduction.

Woodside Energy, Australia

Watson for HSEQ – Learning from History

In 2017, Woodside delivered Watson for HSEQ. This intelligent research assistant builds on developments in data analytics and cognitive computing.

Watson for HSEQ is a cognitive search and analysis platform that is available to all Woodside personnel. It allows each user to search multiple data sets, tapping into historical corporate knowledge, surfacing valuable insights from multiple different internal and external systems encompassing over 500,000 records.

Watson for HSEQ has enabled a step-change in how Woodside learns from events as part of its focus on HSEQ performance improvement, supported by its process safety management framework.





Research Project

Recognises the project or process that best demonstrates a novel chemical or biochemical engineering solution to improve resource efficiency, lifetime value and/or process automation.



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Otto Simon is a process-led engineering consultant and project delivery organisation providing services to the process and industrial sectors in the UK and around the world. Established in 2004 but with origins dating back to 1872, Otto Simon builds upon our experience with innovation.

We work successfully with a wide range of clients to deliver cost-effective, innovative and practical solutions across the full project life-cycle; including due diligence, technology integration, front end design, project management, turnkey project delivery and O&M asset management.

We pride ourselves on the flexible nature of our project delivery, and tailor our services to suit individual client's needs.

www.ottosimon.co.uk

Croda, CPI, NiTech© Solutions and University of Cambridge, UK

Increasing Productivity Utilising Innovative Technology

An innovative project has established a new Croda manufacturing process for the production of speciality chemicals. By working together in collaboration, the new technique and utilisation of NiTech©'s continuous reactor technology, and significant scale up knowledge at CPI, has reduced infrastructure costs and improved efficiency, without impacting on quality. Whilst establishing the technical viability and potential for full-scale commercial adoption, it also demonstrates significant benefits in economic, environmental and social aspects.

The innovative solution allows Croda to increase their production within the current plant space whilst remaining agile and improving the process safety profile of the plant.

Dow Polyurethanes, Dow Engineering and Process Sciences, Dow Core R&D Chemical Sciences, Dow Alkoxylation Technology Centre and Dow Process Analytical, US

New Catalyst Technology for Polyol Manufacturing

The Polyurethanes business of The Dow Chemical Company has commercialized the new GEMINI catalyst technology, reducing waste and creating a more environmentally sustainable and higher productivity manufacturing process for the polyurethanes industry.

The new catalyst technology enables significant expansion of the types of products that can be prepared in existing polyol reactors with a very low capital investment. The use of GEMINI catalyst technology also simplifies the recycling of greenhouse gases back into polyurethane products. GEMINI catalyst technology has become the standard operating design for future Dow polyol manufacturing plants.



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Imperial College London, UK

Next-Generation Hybrid Solar Systems

The Clean Energy Processes (CEP) Lab at Imperial College has developed a novel integrated PV and solar-thermal (PVT) hybrid panel technology that breaks entirely from the optical and thermal design principles employed in all current PVT panels.

The technology can deliver up to 3-4 times more useful energy (electricity plus heat) than standard PV panels and up to 1.5-2 times more energy than conventional hybrid PVT panels from the same area. It is also cost-competitive with low-cost/low-end panels.

A patent has been filed and the CEP Lab is now working with spin-out company Solar Flow, investors and original equipment manufacturers on a full-scale demonstration project funded by the Department for Business, Energy and Industrial Strategy.

North Carolina State University, US

Illuminated Route to Self-Sterilising Surfaces

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University of Cape Town, South Africa and Future Water, UK

Development of a Fertilizer-Producing Urinal

Optimising urban wastewater treatment infrastructure is not going to reduce the thirst for water and stem the hunger for resources of cities in a water- and resource-scarce future. We need innovative solutions that disrupt the status-quo. The separation of urine at source has the potential to achieve this.

This project developed the world's first fertiliser-producing, waterless urinal that collects and treats urine on site. The urinals can be transported to resource recovery plants where urine can be upcycled into many useful products such a fertiliser, water, energy or even hydrogen gas thus further driving a circular and green economy.

University of Oxford, UK

Engineered 3D-Microtumours for Personalised Cancer Therapy

The estimated annual cost of ineffective cancer treatment in the US alone is US\$350bn. Therefore, the efficient production of realistic human tumour-mimics is of enormous potential importance for testing drug efficacy, tackling ethical issues concerning the use of animals and in reducing the costs of chemotherapeutic development.

The University of Oxford has employed a new microfluidic strategy to engineer uniform 3D-microtumours from human cancer cells at a production-rate of 1000 /hour for drug testing. The approach enables the incorporation of tumour matrix, closely resembling the tumour-microenvironment. This research is a significant step towards making personalised cancer therapy accessible to all.





Sustainability

Recognises the project, process or product that best demonstrates innovation in waste reduction, recycling, reuse or the lengthening of product lifecycles

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Unilever is one of the world's leading suppliers of food, home care, personal care and refreshment products with sales in over 190 countries and reaching 2.5 billion consumers to help them look good, feel good and get more out of life.

Our aim is to make sustainable living commonplace. When consumers reach for affordable soaps that combat disease, luxurious shampoos or everyday household products, there's a good chance the brand they pick is one of ours.

Our range of world-leading brands includes Dove, Axe and Omo. Many of our leading products were developed at Unilever Port Sunlight R&D in the UK.

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Advanced Plasma Power, University College London, Cadent Gas, Progressive Energy, UK

Converting Waste to BioSNG

This consortium has developed an innovative and highly-competitive process to convert biomass and municipal solid waste into BioSNG, a sustainable, drop-in replacement for natural gas that can be used to heat homes and power heavy-duty vehicles. The patented process design, which has been demonstrated at pilot scale, includes a two-stage gasification process and a simplified catalytic train, which helps maximise yield and minimises residues and effluents from the process. The project led to the realisation of the world's first commercial demonstration plant to produce renewable, low-carbon BioSNG by gasification of household waste.

Ecolab, UK

Ecolab 3D TRASAR™ Technology Drives Sustainability

Around the world, water scarcity is becoming increasingly real. Safe food is also becoming more paramount to ensure consumers' health. Designed for the food and beverage industry, Ecolab's innovative 3D TRASAR™ for Clean-in-Place (CIP) technology addresses both rising issues.

3D TRASAR™ for CIP utilises advanced sensors to monitor and provide in-depth visibility to operational and food safety issues. The technology detects system variances to inform actions and improve operational efficiency to enhance productivity, and reduce water and energy use. With food safety uncompromised, 3D TRASAR™ for CIP helps customers minimise their environmental impact to ensure a better world for tomorrow.



Hong Kong Productivity Council, China

Food Waste Total Recycling Process

Hong Kong Productivity Council has developed a novel zero-effluent discharge process with specialised microbes to convert food wastes into valuable products, including high purity biogas (~80% methane), protein-rich eco fish feed and oil for biodiesel production. The invention helps solve food waste disposal problem, recover valuable resources, generate renewable energy and reduce carbon emission. It can be applied as a network of decentralised systems to recycle food waste. Besides biogas as important renewable energy, fish feed produced can support local fish farming to form a low-carbon food system in urban cities. A pilot plant has been built to demonstrate the technology.

IOI Edible Oils, Malaysia

Heat Recovery Using Vent Economisers

The project enables heat to be recovered in a dry fractionation plant. It uses a vent economiser to recover heat from steam vapour from a condensate recovery tank vent. This vapour is used to heat water, reducing steam consumption by 18%.

The same idea has been replicated in a palm kernel dry fractionation plant in the complex, yielding a staggering 50% savings in steam costs.

This was accomplished by replacing the steam heating by hot water and recovered condensate, as well as with the vented vapour. This reduces energy costs and also prolongs the lifespan of the heat exchanger.



Lehigh Technologies and Michelin, US

Making Tire Production Fully Circular

Lehigh produces a highly engineered, versatile raw material called micronized rubber powder (MRP) from end-of-life tires. MRP is a low-cost, high-performance, sustainable raw material that can substitute for other oil and rubber-based materials used in manufacturing tires, plastics, asphalt and construction materials.

In 2017, Lehigh was acquired by the tire manufacturer Michelin to build on its 4R strategy of reducing, reusing, recycling, and renewing across its global product lines. This strategic acquisition demonstrates Michelin's commitment to ambitious tire recycling and renewable materials goals by 2048 and to further Lehigh's mission of developing new markets for MRP.

National University of Singapore (NUS), Singapore

Compressor-Less, Chemical-Free, Energy-Efficient Air-Conditioners

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Air is first passed over membranes to be dehumidified. The dry air is then flowed through multiple pairs of wet/dry channels to be cooled. This cooling method ensures that the rejected waste air is also cooled and doesn't create the heated microclimates found outside traditional air conditioners.

PETRONAS, Malaysia

PN2 Membrane for Fuel Gas Conditioning

PETRONAS has developed the PN2 Membrane for fuel gas conditioning. Fluctuation in fuel gas quality severely affects the operation of a dual-fuel power generation system, resulting in higher diesel consumption until fuel gas meets its GHV for a safe switch-over.

Alternatively, the PN2 Membrane separates the associated gas into a hydrocarbon-rich stream (product stream) and CO₂-rich stream (permeate stream) in a simpler operation with higher process reliability, resulting in less maintenance and lower OPEX.

The product stream from the system generates value in the product chain while the permeate stream is used for gas lifting and reduces greenhouse gas emissions.

Stora Enso, Finland

Renewable Lignin Replaces Fossil-Based Materials

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Team

Recognises the best team responsible for implementing and/or developing initiatives, products, projects, processes or services.

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BakerHicks.

BakerHicks is a design and engineering company specialising in complex process, infrastructure and built environments across the full project life cycle. We have delivered numerous projects for our chemical, biopharmaceutical, manufacturing and nuclear customers; using the latest innovations in Building Information Modelling (BIM) to deliver a complete design service.

Supporting internationally recognised brands from our offices in the UK and Europe, our process and engineering teams use specialist knowledge to guide clients on their improvement and investment goals. From high containment and continuous processing to modularisation and process safety; our team can support the successful delivery of your projects.

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Costain, National Grid, Skansa and Mott Macdonald, UK

London Power Tunnels

The London Power Tunnels project has created a new 32km electricity superhighway deep below the capital, which helps keep Londoners connected to safe and reliable electricity supplies.

The partnership had a "one team" philosophy whereby a multitude of suppliers all worked together as one to overcome the multitude of interfaces across the complex project.

GHD, Australia

A Diverse Team Delivering Diverse Projects

The Risk Management team at GHD Advisory works together to celebrate difference and champion gender balance in the engineering consulting sector.

The team has been able to achieve an equal mix of genders, integrate multiple nationalities, speak different languages and support individuality through mentoring and flexible working hours.

The team believes that diversity and inclusion is less about meeting company targets – it's more about high quality outcomes, which is achieved together as a more diverse team. Having a breadth of experience and perspectives allows GHD to add value to an increasingly diverse client base and better connect with wider society.

Jacobs, Atkins and Sellafield Ltd, UK

Integrated Team delivery of Critical Risk Reduction Mission

Sellafield's First Generation Magnox Storage Pond (FGMSP) is one of the world's most technically challenging environments, containing significant quantities of radioactive sludge and fuel. The project team installed a sludge retrieval and effluent process system into the FGMSP, which resulted in transferring the sludge into a modern stainless-steel container – a hugely significant milestone for the UK nuclear industry. The project team is now embarking on the final and most challenging part of the mission and is on track to deliver early high hazard risk reduction, which will leave behind a legacy of learning, highly skilled personnel and an enhanced supply-chain.

Recycling Technologies, UK

Expert Team Cracks Plastic Waste Problem

In a world where only 10% of valuable plastic waste materials are recycled each year, Recycling Technologies has developed an innovative machine to recycle mixed plastics – including hard to recycle films, and coloured and laminated plastics – in a commercially attractive way.

The RT7000 will recycle residual plastic waste into a valuable oil commodity, called Plaxx®, which replaces fossil fuel derived feedstock into new plastic production and synthetic waxes. With the support of world-leading industry and research experts, the modular RT7000 has been designed to be mass-produced and transported to recycle waste at source, anywhere in the world.





Sellafield Ltd, UK

Working Together to Commission Evaporator D

The Evaporator D facility replaces the existing evaporator fleet at the Sellafield site in support of an evolving mission including end-of-life reprocessing operations and high hazard reduction. It incorporates new technology to allow processing of solidsbearing radioactive liquors as part of Sellafield's decommissioning strategy.

Bringing Evaporator D into active service represents the most significant, high profile engineering project for the UK's nuclear industry in current times. The performance of the team and resilience shown whilst faced with significant challenges has been outstanding.

Resolution of fundamental design issues ensured the evaporator entered active operation without incident, and in time, to safeguard hazard reduction and operational programmes.



Sellafield Ltd, Progressive Alliance, AXIOM, UK

Collaborative Working Enables Major Project Delivery

The Sellafield Product and Residues Store (SPRS) Retreatment Plant project is to deliver a new facility to enable long term storage of plutonium at the Sellafield site. Through collaborative working and effective integration of supply chain partners, the preliminary design for this £600m nuclear new build project was accelerated to deliver in a 12-month timescale.

The collaborative behaviours and ways of working enabled the project team to deliver a quality facility on time and on budget, in a highly pressured and scrutinised environment. It has also provided a blueprint for successful project delivery at Sellafield, which is to be rolled out to all future major projects

United Utilities, Jacobs, DJS Research, Vivid Economics, Mott Macdonald, Servelec Technologies, Ainsty Risk Consulting, UK

Manchester and Pennines Resilience Team

The Manchester and Pennines Resilience project addresses the long-term resilience of potable water supplies to 2.5 million people in Northwest England. Many parts of the integrated system are ageing. Just as previous engineers established a sustainable system, current engineers are entrusted with developing enduring and safe solutions for the next generation. The team submitted a detailed business case to the water regulator to secure funding.

Sponsored by United Utilities, utilising skill and experience from Jacobs and other consultants, the team maximised parallel working and engagement of unique services to undertake a complex risk assessment and optioneering to ensure the right proposed solution, supported by customer research.

WorleyParsons, Australia, Reactor Services International, US, and Mecfor, Canada

CAROL (Catalyst Removal Amphirol)

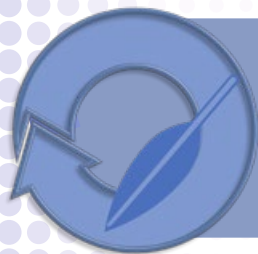
Safety. Quality. Efficiency. Advisian Digital's CAROL (Catalyst Removal Amphirol) achieves all these. It is the industry's first commercial robot for catalyst unloading from refinery and petrochemical vessels. It has the potential to change the way this currently risky process – involving people inside vessels – is performed globally.

The idea was generated and incubated through the WorleyParsons Innovation Process and developed with partners through their Project Management Office.

The first commercial field trial was conducted at an Australian LNG plant where CAROL successfully removed the molecular sieve catalyst (more than 50m³) from a dehydration vessel and avoided confined space entry.

CAROL saves lives.





Training and Development

Recognises the team or organisation that best demonstrates innovation in training, development of staff or education of a wider community.

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Energus, UK

Addressing the Skills Gap

The UK's nuclear industry is facing its biggest challenge in decades. Decommissioning and new build projects mean the need for suitably skilled graduates from the UK is greater than ever.

Energus runs the nucleargraduates programme, under licence to the Nuclear Decommissioning Authority. It was established to bring together organisations from across the industry to attract the next generation of graduates in a strategic, yet cost-effective, manner.

Recruitment, employment, development and delivery of the graduates are carried out by their sponsoring organisations. The nucleargraduates programme is delivered to be adaptable and bespoke to a wide variety of companies and graduates.



Imperial College London, UK

Integrated Process Operations

Given the 30–50 year typical lifetime of an industrial process plant, clean and sustainable chemical production means getting the best from existing equipment.

Automated systems generate diverse measurements from the process, mechanical and electrical subsystems. Data analytics to integrate such data sets needs special methods. These give us real-time knowledge of the condition of interconnected equipment for the optimisation of operations and efficient use of materials and energy.

The project provides a training programme for talented researchers through PhDs and extended industrial placements. The first cohort of researchers have already moved into influential positions in industry and academia.

Megamas Training Company, Brunei

Health, Safety and Environmental Training

Megamas Training Company (Megamas) was incorporated in December 1989 to provide Health, Safety and Environment (HSE) training.

With nearly twenty-nine years of experience, Megamas was the first fully integrated safety training company established in Kuala Belait, Brunei Darussalam, with facilities to cater for all types of training.

With a strong combination of local commitment and global expertise, Megamas is acknowledged as one of the leading training providers in South East Asia with a track record for quality courses to international standards, and world-wide recognition for outstanding achievements. For example, Megamas has achieved 28 years loss time injury free – which means no-one has been injured at work during training that couldn't go back to work the next day.

PETRONAS, Malaysia

PCASB Process Safety 3Sixty (PS3Sixty)

Realising that process safety culture is important to a safe and reliable plant operation, an all-around programme called Process Safety 3Sixty (PS3Sixty) was introduced in 2015 to enhance process safety culture in PETRONAS Chemicals Ammonia Sdn Bhd (PCASB).

PS3Sixty comprises of several programmes that require the involvement of various departments in the company, including the non-technical team, contractors and neighbouring communities.

Several engagement sessions and workshops to educate the contractors on process safety has helped them to understand and appreciate the importance process safety. The PS3Sixty programme has improved process safety culture and safety performance across the company.

Sellafield Ltd, UK

Recruiting, Developing and Retaining Future Engineers

The Sellafield Ltd 12-month industrial placement scheme has successfully operated for over 10 years. The scheme was designed to recruit, develop and retain the best young chemical engineers to be future leaders and technical experts in the business. Sellafield Ltd set out to recruit all its graduates through the scheme, which has now been achieved.

The scheme has been recognised by IChemE for using best practice and has gained very positive feedback from universities. Most importantly, students and graduates want to work with Sellafield Ltd and reach their future potential as chemical engineers.

Sellafield Ltd, UK

Sellafield's Design Engineering Work Experience Programme

How do you inspire 15 to 18-year-olds to do anything?

More importantly, how do those in engineering inspire 15 to 18-year-olds to become engineers?

Sellafield Ltd has an answer to the second question.

It has developed and run a successful, high-class, work experience programme that gives students an insight into the work of the engineering disciplines, the routes to become an engineer and some of the types of engineering available. Engineers at all levels and disciplines across the business deliver the scheme with the same enthusiasm that kick-started their careers to motivate the next generations.

Singapore Institute of Technology and Pfizer Asia Pacific Pte Ltd, Singapore

Specialist Certificate in Process Safety

The Singapore Institute of Technology partnered with Pfizer to develop eight process safety workshops (titled Specialist Certificate in Process Safety) to harmonize process safety training, and to meet the new standard for Safety Case Regime in Singapore. It was supported by the National

Trades Union Congress and funded by Employment and Employability Institute.

The initiative has not only helped to upskill current technical engineers, technicians, and process safety practitioners in Singapore's oil, petroleum, energy, chemicals and pharmaceutical industries to keep up with the new Safety Case Regime, but also ensure new engineers joining one of the industries have the basic process safety skills required.



Syngenta, UK

Syngenta Process Engineering Training Scheme Success

Syngenta's process engineering training scheme was founded in 2012 and is now delivering on its goals. The accredited programme has seen its engineers become professional Chartered Chemical Engineers and take up key roles within Syngenta, adding value to the organisation. The training scheme has provided a structured and dedicated approach to ensure Syngenta's graduates are well-trained and supported during their development. The training provided enhances confidence and competence, which will remain for each individual in whatever career path is taken. Prior to the scheme being set up, Syngenta had minimal exposure in the UK graduate market.

Unilever and GHD, UK

Unilever Advanced Manufacturing Research and Development Centre

The Advanced Manufacturing Research and Development Centre is Unilever's world-class innovation and scale-up facility at its historic home in Port Sunlight in the UK.

The facility houses pilot plant capabilities designed to rapidly deliver "right first time" scale-up for new product developments in liquids processing and packaging for both home care, and beauty and personal care product divisions.

In addition, the facility is digitally driven, enabling chemical engineers to combine multiple on- and off-line data sources from manufacturing processes and laboratories via a unique globally supported application. This enables real-time sharing of tests to partner plants resulting in rapid scale-up and further opportunities in digital modelling of processes.

The AMC also hosts Unilever's Training Academy for Process Engineers and Packaging Technologists and has been attended by hundreds of engineers from all parts of the globe.





Water

Recognises the best project or process to demonstrate innovation in water use, clean-up and re-use, with a particular emphasis on reducing environmental impact while preserving commercial viability.

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GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation.

Privately owned by our people, GHD provides engineering, environmental and advisory services to private and public sector clients across five continents and the Pacific region. Focused on creating lasting community benefit, our connected global network of 10,000 people delivers projects with high standards of safety, quality and ethics.

Committed to sustainable development, GHD improves the physical, natural and social environments of the many communities in which we operate.

www.ghd.com

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Ecolab, UK

Ecolab 3D TRASAR™ Technology Drives Sustainability

Around the world, water scarcity is becoming increasingly real. Safe food is also becoming more paramount to ensure consumers' health. Designed for the food and beverage industry, Ecolab's innovative 3D TRASAR™ for Clean-in-Place (CIP) technology addresses both rising issues.

3D TRASAR™ for CIP utilises advanced sensors to monitor and provide in-depth visibility to operational and food safety issues. The technology detects system variances to inform actions and improve operational efficiency to enhance productivity, and reduce water and energy use. With food safety uncompromised, 3D TRASAR™ for CIP helps customers minimise their environmental impact to ensure a better world for tomorrow.

The University of Newcastle, Australia

Hydro-Harvester: A Novel Atmospheric Water Generator

As one of the five finalists of the global competition "Water Abundance XPRIZE, powered by Tata Group and Australian Aid", the University of Newcastle (Australia) team has developed a novel atmospheric water generator, named Hydro-Harvester, capable of extracting up to 2000 litres per day of water from air using 100% renewable energy and at a life-time cost of no more than 2 cents per litre. This cost-effective and energy efficient device has nearly zero carbon footprint and can be scaled and/or adapted to a wide range of applications, including residential, commercial, remote businesses (eg mining) and special use (eg military, and emergency services).



University of Bath, UK and Universidad de Los Andes, Colombia

AguaSens

We have developed an innovative multisensing tool, AguaSens, for real-time and at-site water monitoring, which can safeguard vulnerable communities from the consumption of contaminated water; thus preventing or minimising the risks of waterborne illnesses.

AguaSens is the result of an effective collaboration between two research institutions in the UK and Colombia, which have helped addressed the intrinsic multidisciplinary nature of our project. Although our project was focused on Colombia, AguaSens can have an impact anywhere in the world where rapid and simple water monitoring is key.



University of Malaya and Berqat Mechanic Engineering, Malaysia

Self-Cleaning Ultrafiltration System Producing Clean Water

This project involves the development of an automated self-cleaning mobile ultrafiltration system to produce clean water from various sources, including river water, underground water and spring water.

It incorporates a self-cleaning smart backwash system eliminating the use of chemicals. It can also be driven by solar power and can be easily transported to rural areas whenever needed. It is a green system with high socio-economic impact addressing clean water security goal (SDG6). The system has been installed in many remote villages in Malaysia and can produce clean water at a cost less than MYR 0.20 (£0.10) per m³.

Wood, UK

Innovative Sewage Treatment – Process Intensification

Adoption of novel technology at the Seaton Carew sewage treatment works has demonstrated the value of innovative design by increasing capacity while reducing running costs.

The project concept was developed by Wood, Eliquo Hydrok and Northumbrian Water Ltd. Compared to a conventional plant extension, the introduction of Integrated Fixed-film Activated Sludge technology has seen whole-life costs reduce by 20% (worth £2 million), a 16% reduction in power usage and minimal maintenance requirements, and all delivered through a shorter build programme by Interserve Construction Ltd.

The project has given the community – domestic and industrial users – secure, future-proofed wastewater treatment facilities, while preserving the local environment.





Young Industrialist

Recognises the individual who best demonstrates their achievements and tangible application of chemical, biochemical or process engineering skills to address important economic, environmental or social issues. All entrants must have been born on or after 1 January 1988

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GSK engineers and technical experts transform the work of our scientists into medicines and healthcare products and design devices to deliver them into the human body. Advances in science and technology allow us to explore novel ways to continuously improve our manufacturing processes to make our products more accessible to patients and consumers worldwide, in more efficient and sustainable ways.

The 2018 Young Chemical Engineer in Industry award aligns with our commitment to developing people with the kind of expertise that brings to life our GSK mission to help people do more, feel better and live longer.

www.gsk.com

Catherine Anne Tait

Atkins, UK

Catherine Anne Tait graduated in 2014 with a first class Master's degree in chemical engineering from the University of Strathclyde. She gained a scholarship from Atkins as an undergraduate, and joined the business after graduation. She initially joined the process safety team where she spent a year in a range of offshore process safety tasks, including safety case development support, risk assessment, and hazard identification. She transferred to the nuclear department of the business in 2015, continuing to work on a range of safety-case related work for UK clients, and this month is moving to deliver a new safety role within the rail department of the business.



Dr Stafford Wheeler Sheehan

Catalytic Innovations, USA

Stafford Wheeler Sheehan is the founder of Catalytic Innovations, where he has been commercialising sustainable electrocatalyst technologies.

He received his PhD in chemistry with distinction from Yale University, was listed one of Forbes '30 under 30' in the energy sector, and was one of Chemical & Engineering News' Talented 12.

He has had 27 academic papers published in peer-reviewed chemistry and chemical engineering journals, and has a background as an entrepreneur working at start-ups in software engineering and chemical engineering for industrial waste remediation.

Harry Glover

ExxonMobil Chemical, UK

Harry Glover holds a first class Master's degree in Chemical Engineering from the University of Cambridge. Before graduating in 2015, he completed an internship with ExxonMobil and had his research paper on industrial jet cleaning published, with Harry as lead author.

Since 2015, Harry has excelled in three Process Engineer roles for ExxonMobil, completing a number of challenging tasks and delivering strong business results in reliability, safety and profitability. Two standout achievements to date are his application of thermodynamics to diagnose and resolve a long-term tubular reactor failure mechanism, and theorising, then proving, an unknown mass transfer phenomena in a reactive liquid-liquid extraction process.

Michael Carson

ExxonMobil Chemical, UK

In his short time at Fife Ethylene Plant, Michael Carson has consistently demonstrated an ability to understand and apply chemical engineering knowledge to an exceptional level, across a broad spectrum of activities.

He has produced process optimisations worth more than £1m, provided technical leadership to reduce a shutdown duration by 7%, delivered energy optimisation benefits of £500k and as Safe Operations Committee secretary has led the identification and development of numerous process safety improvements.

With a passion for chemical engineering, he provides effective coaching to new graduate engineers and inspires engineers of the future through a variety of science, technology, engineering and maths (STEM) engagement activities.

Sophie Duffield

GSK, UK

Sophie Duffield is a chemical engineer who has held several roles within GSK since 2015. She has excellent technical capabilities and has demonstrated her agility in applying these skills to a wide variety of challenges.

Her achievements include design and scale-up work to deliver GSK's first active pharmaceutical ingredient pilot plant manufacturing campaign using continuous technology. She was also responsible for the accelerated decontamination of a bioprocessing extraction plant that resulted in a significant cost saving.

Throughout her roles, Sophie has demonstrated her exceptional problem solving and leadership skills and was shortlisted for the 2017 Chemical Industries Association's *Young Ambassador Award*.

Vincenzo Caruso

GSK, US

Vincenzo Caruso is a Biopharmaceutical Engineer with GSK and is a member of GSK's Future Leaders Programme (FLP).

Vincenzo's responsibilities include the development and implementation of process improvement initiatives to GSK's biopharmaceutical manufacturing methods.

He serves on the FLP Graduate Advisory Board, which is responsible for improving communications and feedback between programme members and senior management in order to continuously improve the programme for future participants.

He graduated Magna Cum Laude from the North Carolina State University School of Engineering and holds a BS in Chemical Engineering with a minor in Biopharmaceutical Manufacturing and a BA in Chemistry.





Rojjar Ferschy
Sellafield, UK

Rojjar Ferschy is a talented communicator and multi-faceted professional, who has worked against great adversity as a displaced person to accomplish her numerous achievements.

She continually proves herself through her dedication to her professional work and her voluntary activism. Her story is extraordinary and serves as an inspiration to engineers worldwide. Her potential is boundless, and it would be a difficult task to overstate her current accomplishments.

There is no one more deserving of this award than Rojjar; a professional engineer with an attitude that has nurtured positivity and hard work, she is an exceptional candidate for the Young Industrialist Award.

Chew Chien Lye (Mervin)
Sime Darby Plantation, Malaysia

Chew Chien Lye (Mervin) is an outstanding senior engineer at Sime Darby Research with a double degree in mechanical engineering.

His work focusses on process improvement, and specifically on quality enhancement and efficiency optimisation.

Trained with technical engineering skills in oil milling process along with research background, he possesses the ability to not only improvise with, and improve upon, existing processes, but also develop new processes that are applicable to the industry.

To date, he has filed four patents on mill process improvement that have potentially generated additional revenue, and reduced energy consumption and wastewater generation.

His enthusiasm and his broad knowledge make him a distinguished engineer who is destined for significant accomplishment.





Young Researcher

Recognises the individual who best demonstrates the impact of their research in helping to address important economic, environmental or social issues, born on or after 1 January 1988.



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Our team of chemical engineering specialists can assist on any level; from simple one-off consultations to the design, installation and commissioning of complete projects.

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Anton Ochoa Bique
Bremen University, Germany

Anton Ochoa Bique is a PhD student at the laboratory of process systems engineering (PSE) at Bremen University. Before he joined PSE lab, he studied and conducted research at Tomsk University and Institute Politecnico di Milano. His thesis concerns the strategic design of hydrogen infrastructures under uncertainty; where he develops and uses PSE tools at the level of unit operations, plant, and supply chain network. His first paper, which was published in Chemical Engineering Research and Design concerns the setup of a hydrogen supply chain for the German landscape. Currently, he develops tools for addressing uncertainty and multi-criterion decision making (cost, environment and risk).

Patrick Agese
Costain, UK

Patrick Agese focuses on developing novel solutions to current energy issues. His research project (Urban Energy Rhythms) examines various energy assets such as renewables and energy storage with the aim of modelling different energy scenarios across infrastructure systems underpinning the importance of energy flexibility in smart cities. Prior to undertaking this PhD research project at the University of Reading, Patrick worked on large energy demand reduction projects at Givaudan and developed energy performance contracts at Anesco. He is also a sustainability enthusiast and has dedicated his professional career to developing sustainable energy solutions beginning at the age of 11.

Donal Finegan
DOE National Renewable Energy Laboratory, US

The synergy of Dr Donal Finegan's positive approach to problem solving and collaborative spirit has led to a tremendously productive and impactful early career. His name is widely known among the international battery community for leading high-impact, practical, and rigorous investigations into battery failure. His innovation and insights have had direct positive impacts on the design of next generation Li-ion batteries as well as advanced energy systems, including some of NASA's manned space applications. Combined with his outstanding track record and talent in communicating his research to a broad audience, he stands out as an exemplary researcher and engineer.

Joshua McCann
Green Lizard Technologies and Queen's University Belfast, UK

Josh McCann is a graduate of Queen's University Belfast (QUB) with a Master's in chemical engineering. He has been involved with Green Lizard Technologies (GLT) since 2015. Currently, he is a third year PhD researcher within the vegetable oil research group in GLT. He has helped scale two chemical processing technologies for oils from bench-scale to the 1 t pilot scale, both with industrial partners and also as part of a new start up, Oleocycle.

His interests outside the field include entrepreneurship, building small scale renewable energy systems and he is a member of Engineers Without Borders (EWB), Ireland.



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Wen Li

The University of Melbourne, Australia

Wen Li is an early career researcher who specialises in solvent extraction technologies. Her research interests are on the application of advance extraction column internals, designs and solvent systems to increase the efficiency of the extraction process. She is an expert in copper recovery by pilot-scale pulsed disc and doughnut solvent extraction column and is an outstanding researcher in uranium recovery. She is now expanding her career path through a research fellow role at the University of Melbourne, developing the innovative extraction process to enhance the efficiency of lithium recovery from salt lake brine.

Vasileios Charitopoulos

University College London, UK

Vasileios Charitopoulos is one of the most promising young researchers in the field of process systems engineering who employs rigorous mathematical methods towards solving challenging manufacturing and energy problems. His doctoral research is dedicated to the development of computer-aided methods to enable sustainable smart manufacturing while he is also concerned with the application of economic optimisation in the context of energy policy. Hard-working, visionary, charismatic and intelligent, he has been awarded for his academic performance in a number of instances setting him in an orbit for academic success.

Dr Hikaru Graeme Jolliffe

University of Strathclyde, UK

Dr Hikaru Graeme Jolliffe is a British-Japanese researcher who was born in Luxembourg. He undertook his undergraduate and Masters study in Scotland (2008–2014) at the University of Edinburgh, studying chemical engineering with environmental engineering. He completed his PhD (2014–2018) under the supervision of Dr Dimitrios I Gerogiorgis, at the School of Engineering (Institute for Materials and Processes) of the University of Edinburgh. His PhD Thesis evaluated the benefits of Continuous Pharmaceutical Manufacturing (CPM). He is currently a Digital Manufacturing Engineer at the Continuous Manufacturing and Crystallisation (CMAC) Future Manufacturing Research Hub at the University of Strathclyde, Glasgow, UK.

Ong Wee Jun

Xiamen University Malaysia, Malaysia

Dr Ong Wee Jun received his BEng and PhD (chemical engineering) from Monash University in 2012 and 2016, respectively. In 2016, he joined the Institute of Materials Research and Engineering at Singapore's Agency for Science, Technology and Research (A*STAR) as staff scientist. Since 2018, he has worked as assistant professor in the Department of Chemical Engineering at Xiamen University Malaysia. His research includes designing two-dimensional-based nanohybrids (e.g. graphene, graphitic carbon nitride, MXene) for artificial photosynthesis. His research's breakthrough is the successful engineering of photocatalysts for efficient utilisation of solar light for splitting water and reducing CO₂ into energy-rich fuels to mimic natural photosynthesis in plants.



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Table Centres



Myerscough College Floristry lecturer Sam Cook and her students have designed and created the table arrangements for the event as an elements of enrichment on their programme.



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