Petrofacts

October 2014

Petrofac

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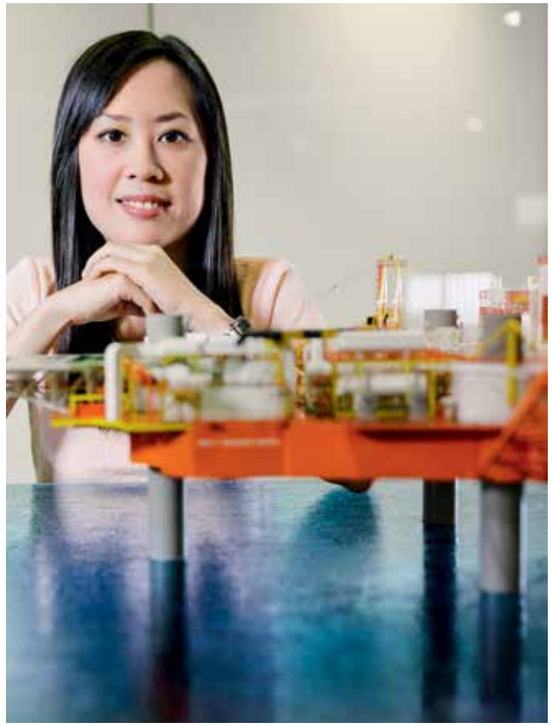

PHOTOGRAPH BY IAN TEH

Featured story: The depths of imagination
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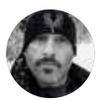
Emeline Chong goes beneath the surface

Contributors

Peter Halliday
Copywriter
Peter has worked with the world's best known brands. His words have appeared in the likes of *The Economist* and the *FT*.



Marc Morrison
Photographer
Based in Austin, Texas, Marc has 28 years' experience, working primarily in the energy and entertainment sectors.

Helen Campbell
Journalist and writer
A languages graduate, Helen – a journalist for 19 years – writes on energy, shipping and technology.

Philip Sayer
Photographer
Philip's clients have included leading art galleries and museums. He was one of the founding members of *Blueprint* magazine.

Michael Kirkham
Illustrator
Michael's work has appeared in the *New Yorker*, *The Guardian*, and in books for Penguin (US) and Faber & Faber.

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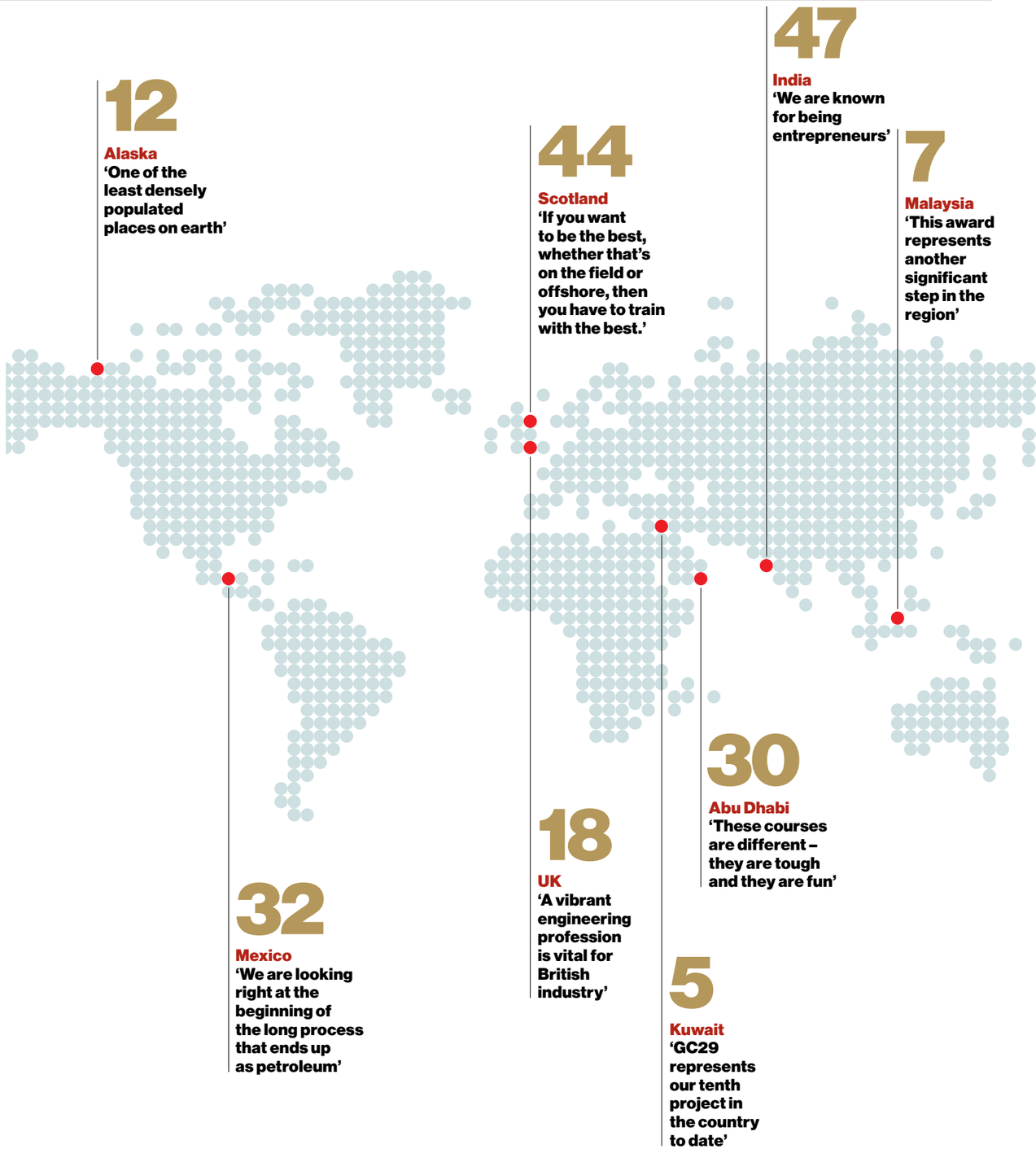
Every employee should receive a copy; contact petrofacts.distribution@petrofac.com if you'd like to receive a copy

Editor
Lucy Almond
Art Direction
Esterson Associates with Isabel Duarte
Picture Editor
Millie Simpson
Consultant Editor
Paul Keers
paul@keers.co.uk
Printed by
www.push-print.com



BOARD CHANGES

Changes at the top, as Norman Murray steps down, and Rijnhard van Tets assumes the role as chairman

Petrofac announced in August that Norman Murray, chairman since May 2011, had resigned from the board and was stepping down as chairman with immediate effect for compassionate reasons.

Senior independent director Rijnhard van Tets assumed the role of chairman. He was appointed as a non-executive director in 2007 and became senior independent director in 2011. Rijnhard has more than a decade of board experience including at ABN AMRO. Non-executive director Thomas Thune Andersen has become senior independent director.

'Rijnhard is an experienced chairman'

Norman Murray said it was with "tremendous sadness" that he was stepping down from the board, and he thanked his colleagues for their support during his tenure.

Ayman Asfari, Petrofac Group chief executive, thanked Norman for leading the board so effectively for the last three years. "Whilst it is with great sadness that we accept his resignation, we understand his reasons and our thoughts and best wishes remain with him and his family," he said.

"I am pleased that we have appointed Rijnhard who is an experienced chairman and whose knowledge and understanding of Petrofac will hold us in good stead as we move forward. I look forward to working with Rijnhard and the rest of the board as we continue to grow and strengthen our business."

Rijnhard van Tets, now chairman of the Group

INTERIM RESULTS

Petrofac reported its interim results towards the end of the summer, with 2014 revenue and net profit significantly weighted towards the second half of the year, reflecting the phasing of project delivery. The company announced that it was on track to deliver net profit in the range of $580 million to $600 million for the full year.

It has been the most successful year for new awards, with ECOM's order intake of $7.2 billion in the first half of the year. The project backlog is up 35% to stand at record levels of $20.3 billion at 30 June 2014. The interim dividend was maintained at 22 cents per share.

Ayman Asfari, Petrofac's Group chief executive said: "In ECOM, we have already had our most successful year for new awards, bid at margins consistent with our medium-term guidance, reflecting ongoing high levels of investment by our customers in our core geographic markets and our strong competitive position. Our pipeline of bidding opportunities remains attractive and we are confident of securing a number of further awards and contract extensions during the second half of the year.

'In ECOM, we have already had our most successful year for new awards'

"In IES, we are making good progress on addressing project performance issues and the delivery of key operational milestones," he added. "Looking further ahead, we have re-focused our IES business development plans and our innovative venture with First Reserve reinforces the role of IES as an enabler for the Petrofac Group, allowing us to concentrate our resources on our core strengths." (See page 8 for the full story on PetroFirst Infrastructure Partners.)

FIVE ENGINEERS WIN FELLOWSHIPS

Five engineers who are about to start their postgraduate studies have each received a Petrofac/Royal Academy of Engineering Fellowship.

Now in their sixth year, the Petrofac Fellowships combine a full-time Masters' level course with development opportunities, such as a role in a major project in Petrofac.

Petrofac's Group chief executive, Ayman Asfari, said: "This partnership has been mutually rewarding for the mentors and the Fellows, some of whom have since been employed within Petrofac. I am delighted to welcome five new engineers as Fellows and I look forward to watching their progression throughout the coming year."

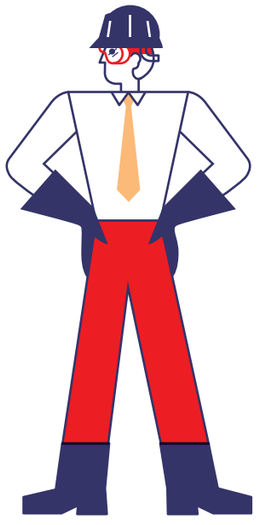
This year's recipients are: Karim Elrify studying oil and gas engineering, Antreas Koumous studying petroleum engineering, Hadi Khubeize studying offshore and ocean technology with pipeline engineering, Harris Rani studying petroleum engineering, and Huroon Khan studying offshore and ocean technology with pipeline engineering.

OUR 'MATERIAL ISSUES' ASSESSED

Petrofac held its first 'materiality workshop' in June, facilitated by consultancy DNV GL to understand what non-financial measures our stakeholders would like to see reported.

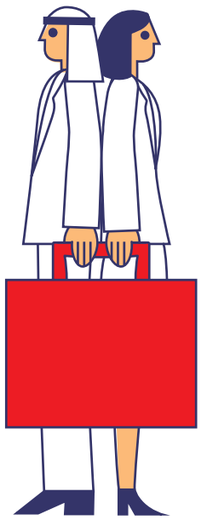
Materiality assessments are now a good practice feature of corporate reporting. One interesting element of the process is the involvement of external stakeholders, who are canvassed to assess their views of the key issues facing the company – which may differ from internal perceptions. A series of interviews were held with a cross-section of people selected from our partners, our investors and civil society, and the results were fed into an assessment process involving senior management – seen as a useful check on the company's assumptions about priorities for external communication. Outlined in the illustrations below are examples of the types of issues raised as 'material' for Petrofac during this process.

WORKER SAFETY



This is about providing a safe working environment for our employees, our contractors and all who come into contact with Petrofac .

DIVERSITY & EQUALITY

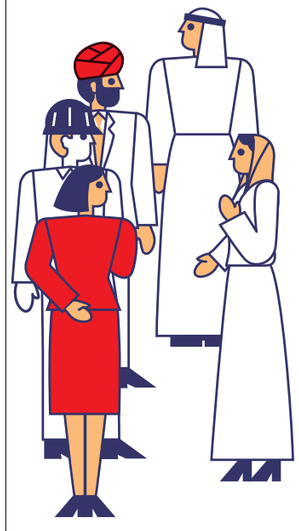


This is about ensuring equality of opportunity and fairness in all areas, and valuing the diversity of employees, customers and communities.

SUPPLIERS & CONTRACTORS

Our approach to managing contractors and suppliers is underpinned by seeking honest, open relationships based on fairness, trust and respect.

IN-COUNTRY VALUE (ICV)



ICV is the total spend retained in a country that benefits business, contributes to human capability and stimulates productivity.

ILLUSTRATIONS BY JAMES GRAHAM

KUWAIT GATHERING CENTRE PROJECT

Petrofac received an award notification in July for Kuwait Oil Company's (KOC) gathering centre 29 (GC29), which is located 70 km north of Kuwait City.

Valued at approximately $700 million, the project will be completed over a period of three years. The competitively tendered lump-sum greenfield scope of work includes the engineering, procurement, construction, pre-commissioning and commissioning of GC29.

GC29 is one of three gathering centres being constructed to support KOC's plans to increase and maintain oil production over the next five years. Each of the three gathering centres will be capable of producing around 100,000 barrels of oil per day together with associated water and gas.

Subramanian Sarma, managing director of Petrofac's Onshore Engineering and Construction business, said: "We have a long track record with KOC which extends over the last 14 years and the award of GC29 represents our tenth project in the country to date.

"With ongoing projects for both KOC and Kuwait National Petroleum Company and good visibility of the future pipeline, Kuwait is, and will continue to be, of strategic importance to Petrofac's ambitions in the Middle East market."

INCREASED PRESENCE AT ADIPEC

Petrofac is expanding its involvement at ADIPEC – the Abu Dhabi International Petroleum Exhibition and Conference – this year. The conference and exhibition is the third largest oil and gas event globally, and the largest outside of North America.

Hosting the major NOCs and IOCs, with its entire supply chain represented, Petrofac is showcasing its activities and services at its large exhibition stand. Petrofac has also taken up sponsorship opportunities this year, particularly around the Young ADIPEC programme in line with the company's focus on STEM (science, technology, engineering and mathematics) education for social investments.

Making a stand: Petrofac showcasing its activities and services

Young ADIPEC provides a platform for future engineers to develop their understanding of the oil and gas sector and it also encourages them to take careers in the industry.

The conference has more than 350 speakers and 5,000 delegates. A number of Petrofac employees will be delivering technical papers and several senior executives are involved as panel speakers and chairmen covering a wide range of industry topics.

GOLD STANDARD IN HEALTH AND SAFETY

Petrofac Training Services (PTS) has won gold at the UK's Royal Society for the Prevention of Accidents (RoSPA) Occupational Health and Safety Awards.

The recognition in the oil and gas industry category was judged against 19 mandatory health and safety measures, including continuous improvement, leadership and workforce involvement.

RoSPA was set up to save lives, reduce injuries at work and encourage organisations to develop robust health and safety management systems. Since they began in 1956, the awards have recognised commitment to continuous improvement in accident and ill health prevention at work. The scheme is open to businesses and organisations across the UK and overseas.

David Rawlins, RoSPA's awards manager, says: "Organisations that gain recognition for their health and safety management systems, such as Petrofac Training Services, contribute to collectively raising the bar for other organisations, and we offer them our congratulations."

PTS HSSEQ manager, Ian Rush, says: "This exceeded all of our expectations. It's a vote of confidence that we are successfully demonstrating our commitment to health and safety and continuous improvement."

AYMAN ASFARI ELECTED TO FELLOWSHIP

Chief executive Ayman Asfari has been elected a Fellow of the Royal Academy of Engineering, in recognition of his outstanding and continuing contribution to the field.

Ayman, who has more than 30 years' experience in the industry and has spent more than two decades growing Petrofac, has steered the company's work with the Royal Academy for the past five years. This work has focused on supporting the next generation in the industry through a number of successful programmes. These include a Fellowship scheme (see page 4) for graduate engineers, and the STEM (science, technology, engineering and mathematics) Teacher Connectors programme, which aims to encourage young people, particularly those from under-represented parts of the UK, to further study STEM subjects with a view to pursuing a career in engineering.

Ayman said he was deeply honoured. "I look forward to working with the most innovative minds in the industry and contributing to the Royal Academy's aim of promoting continued engineering excellence in the UK," he said.


Petrofac CEO Ayman Asfari and Philip Greenish, CEO of the RAEng

MAINTAINING SUCCESS

Petrofac will provide maintenance capabilities in one of the largest gas developments in the world

Petrofac has secured a contract with the BP-operated Shah Deniz 2 project in the Caspian Sea to provide maintenance build capabilities.

The contract covers new onshore, offshore and pipeline assets in the Azerbaijan sector of the Caspian Sea for what is one of the largest gas developments in the world. It was won by the company's asset performance management consulting business – Plant Asset Management (see page 12).

Due for completion in 2018, this is part of a long-term project that will see Shah Deniz 2 add 16 billion cubic metres per annum (bcma) of production to the 9 bcma already produced, through the opening of a new Southern Gas Corridor to Europe. This award is the latest in a range of work that Plant Asset Management has undertaken for BP including Clair Ridge and Andrew Area Development in the North Sea, In Salah Gas in Algeria, and the Chirag Oil Project also in the Caspian, which led to the signing of a master service agreement earlier in 2014.

The services will include the development of reliability and maintenance strategies, validation of the master equipment list, creation of a maintenance assignment and the development of computerised maintenance management systems data.

Steve Johnson, vice president of Plant Asset Management says: "We are thrilled to be supporting BP with one of their most ambitious projects and for the further opportunity to highlight the skills of our high calibre consultants, engineers, developers and analysts."


Shah Deniz was discovered in 1999, with stage 1 start-up in 2006

RAPID WIN FOR PETROFAC IN MALAYSIA

Petrofac has been awarded an engineering, procurement, construction and commissioning (EPCC) contract by the PETRONAS subsidiary, PRPC Refinery and Cracker.

The award, which was announced in August, is for one of the five contracts for the refinery and steam cracker components of PETRONAS' RAPID (Refinery and Petrochemicals Integrated Development) project. It is located in Pengerang in the Johor province of Malaysia.

Worth more than $500 million, the competitively tendered lump-sum EPCC scope of work includes three sulphur recovery units, two amine regeneration units, two sour water stripping units, a liquid sulphur storage unit and a sulphur solidification package unit.

'This award represents another significant step in the region'


Subramanian Sarma of Petrofac OEC

This project is the largest liquid-based greenfield downstream undertaking in the country. It will have a 300,000 barrels-a-day refinery and will supply naphtha and liquid petroleum gas feedstock for the RAPID petrochemical complex, as well as producing a host of refined petroleum products, including gasoline and diesel.

RAPID is part of the bigger Pengerang Integrated Complex (PIC) development and its associated facilities. These include the Pengerang co-generation plant, re-gasification terminal, air separation unit, raw water supply project, crude and product tanks, as well as central and shared utilities and facilities.

PIC is due for its refinery start-up by early 2019.

Subramanian Sarma, managing director of Petrofac's Onshore Engineering and Construction (OEC) business, said: "This award represents another significant step in building our capability in the Asia-Pacific region.

"Malaysia is a core country for us, and PETRONAS is a key customer, and we have a substantial physical presence in the country to support both our projects and aspirations."

PUTTING MONEY TO WORK

The project execution capability of Petrofac is teamed with the capital capability of First Reserve in our new venture, PetroFirst Infrastructure Partners. Peter Halliday reports. Illustration by Michael Kirkham

Clever. That's how the *Financial Times* describes the recent tie-up between Petrofac and the energy infrastructure business First Reserve to create PetroFirst Infrastructure Partners.

Announced in the summer, it provides a new way to finance the costly infrastructure that is employed in many large Integrated Energy Services (IES) projects. It gives Petrofac a strong competitive advantage and another way to meet customer needs. But it can be a difficult concept to get your head around. So here's the background...

Everyone's money is different.

Yes, every $100 bill has the same intrinsic value. But the way each of us would choose to spend $100 is determined by many different factors – like our aspirations, our existing commitments, our life stage, and so on and so on.

It is exactly the same for different types of company. And this, in the simplest of terms, is the background to the creation of PetroFirst Infrastructure Partners – an ingenious new way to match the right money to the right project at the right time.

So, for example, Petrofac is a people-based business. The company invests in developing skills and expertise. That's where its specialism lies. It's why Petrofac is able to earn healthy margins. And it's what shareholders have come to expect of the business.

Unless it has to, Petrofac prefers not to tie-up its money in equipment, vehicles or any other physical assets. There are exceptions to this rule; for example, Petrofac is currently investing in its own deepwater installation vessel, the *Petrofac JSD 6000*. However, a vessel of this calibre is a strategic asset which is simply not available on the rental markets – and it will enable Petrofac to build a differentiated top-tier engineering, procurement, construction and installation (EPCI) business focused on high-end turnkey opportunities.

But on the whole, physical assets can generally be leased by Petrofac from another company (the type of company that specialises in that particular line of work). Which leaves Petrofac free to spend its own money on the things it does best.

However, for a business like the infrastructure arm of First Reserve, it's a very different story.

First Reserve is an energy-focused private equity and infrastructure investment firm. It invests money committed from pension funds, sovereign wealth funds and other institutional investors. With the firm's infrastructure funds, some of these investors are looking for steady returns over long periods of time. So, for them, owning and leasing out a big piece of infrastructure – like a floating production, storage and offloading (FPSO) vessel – is just the ticket.

If you look at it this way, Petrofac and First Reserve are natural partners.

Take a project like the Berantai gas field development in offshore Malaysia.

This project enabled Petrofac to deploy its respective capabilities on a single integrated project. Together, the teams in Petrofac could meet a wide spectrum of client needs: from the initial conceptual engineering and field development planning right through to the commissioning and into production.

One of the things that set the project apart was the customer's tight timescales. With a full range of in-house capabilities Petrofac was able to 'fast-track' its delivery. And first gas was produced just 21 months after the final investment decision.

As a prerequisite for the project, it was agreed that Petrofac would provide a FPSO vessel. Sourcing and fitting out the vessel in double-quick time was a crucial part of the project. But, once commissioned, it meant that hundreds of millions of dollars of precious Petrofac capital was invested in a piece of infrastructure.

Yes, that infrastructure does earn money. Yes, it does bring a steady return. But owning and leasing infrastructure was never part of the long-term plan – it was only an element of the project, required to meet this customer's needs.

So, against this background, it makes sound business sense for Petrofac and First Reserve to get together to fund clients' infrastructure requirements.

This way, they can liberate the Petrofac money that is already tied-up in fully commissioned infrastructure. And they can also go out to the marketplace armed with a multi-billion-dollar war chest – in order to bid for new projects with an infrastructure component.

In an industry where cash is in short supply, customers (and, in addition, Petrofac's shareholders) can get the best of both worlds – Petrofac's people to provide the expertise and deliver the project, and First Reserve's strategic capital to contribute towards the cost of the infrastructure.

Petrofac has always prided itself on its innovative commercial approaches. For example, the company pioneered the duty holder model in the North Sea. And it offers a full range of commercial models – each of which is designed to recognise customers' commercial goals and reward Petrofac for the added value it brings.

'The main criteria are about opportunities to create value for our customers that require access to capital alongside Petrofac's proven project execution capability.'

Rob Jewkes, IES chief operating officer

The creation of PetroFirst Infrastructure Partners adds another string to the bow.

Of course, allowing third parties to invest in infrastructure is nothing new. And there is a definite trend for oil companies to separate (or disaggregate) their infrastructure from their upstream hydrocarbon resources. But, as IES chief operating officer Rob Jewkes puts it: "What makes PetroFirst Infrastructure Partners so interesting and significant is the fact that, for the first time, a contractor and an investment fund are fully aligned – and able to go to market, hand-in-hand, as a combined proposition."

Given today's market circumstances, it's an appealing and timely offer.

Oil companies may have plenty of reserves sitting under the ground. But cash is tight and the world's stock markets are wary of investing in maturing or marginal oil and gas fields. Consequently, many such companies are either selling assets (as seen with the flurry of activity in the North Sea) or looking for alternative ways to fund their oilfield services contracts. Either way, opportunities abound for Petrofac – to either offer up its services to the new asset owners or propose new commercial models to the existing owners.

Petrofac and First Reserve (with its co-investors), have committed up to $1.25 billion to PetroFirst. With additional borrowings, the available capital could reach $4 billion. And this puts Petrofac in contention for a range of interesting opportunities – where potential customers need a financial partner just as much as they need a service company.

So far, the joint venture has been used to buy three Petrofac-owned floating production facilities (FPSO Berantai, FPF3 Jasmine Venture and FPF5 West Desaru MOPU). But how will the rest of the capital be utilised? What sort of new business opportunities is Petrofac pursuing?

"The main criteria are about opportunities to create value for our customers that require access to capital alongside Petrofac's proven project execution capability.

"The innovative venture with First Reserve is very much aligned to the original rationale for the IES strategy, which first took us into co-investing alongside our clients", says Rob Jewkes.

There is real flexibility on how the capital could be deployed. Other floating infrastructure assets are a natural target, but so will be fixed infrastructure, such as new and existing production platforms, sub-sea tie-backs, bridge-linked riser platforms and the like.

The model also lends itself to the growing industry enthusiasm for contracted and shared infrastructure – whereby Petrofac could develop and manage the production and transportation infrastructure for multiple fields that are otherwise stranded.

The financial community was quick to spot the logic behind the deal. For example, analysts at Goldman Sachs described it as "a strategic positive", UBS said it brings "additional flexibility", and Natixis said it "shows Petrofac's dynamism" as well as its "investment discipline".

The marketplace has been similarly enthusiastic, and the team led by senior vice president Robin Caiger is actively discussing opportunities.

"It has struck a note with a lot of potential customers, and we have a wave of prospects under active discussion. There's no shortage of interest and intrigue – particularly in the UKCS." he says.

About First Reserve

First Reserve is the largest private equity and infrastructure investment firm exclusively focused on energy.

The firm has more than 30 years of industry insight and has invested $30 billion over some 475 transactions. With offices in the US, London and Hong Kong, First Reserve has a global team dedicated solely to energy investment and portfolio companies operating in approximately 50 countries. And one of the things that sets them apart is their energy expertise – so they know all about Petrofac and its delivery-focused culture.

As Bill Macaulay, First Reserve chairman and CEO, said: "The creation of PetroFirst Infrastructure Partners is an exciting opportunity to invest in energy infrastructure alongside a partner with a proven track record for project execution."

Bill Macauley, First Reserve chairman and CEO

SPLENDID ISOLATION

More than twice the size of Texas, Alaska produces around 7% of the USA's domestic oil. Known for its extremes of midnight sun and wintry freezes, its vast wilderness can be captivating. Peter Halliday talks to one of Petrofac's Plant Asset Management professionals about his work in the 'last frontier' state. Photography by Marc Morrison and Mark Meyer

"People either love it here or hate it," says Steve Boddy, Petrofac's 'man in Alaska'. "They seem to struggle through a single season and quickly escape, or settle down and stay forever."

In Steve's case, he is clearly in the latter group. Originally a native of the UK's Yorkshire Ridings, he now calls Anchorage home. With a population of around 300,000, it is also where almost half of all of Alaska's residents live. Steve first visited 16 years ago and has lived there for six years; his wife is a native Alaskan, and his daughter was born in the state.

The oil and gas industry provides around a third of all jobs in this US state which is so far north that, across a year, some of its towns will experience both midnight sun and permanent darkness. Prudhoe Bay, on Alaska's Arctic Coast, is the largest oil field discovered in North America, and over the past three decades its production has fallen from 25% to 7% of total US oil production.

This is easily Petrofac's most northerly operation; it is where the company's Plant Asset Management (PAM) consulting business provides services to BP – which is where Steve comes in, as head of the team providing that service in Alaska. PAM has been working with BP in Alaska for more than nine years where professional asset management consultants like Steve systematically monitor the performance of oil and gas infrastructure. By prescribing proactive and predictive maintenance programmes, they can help avoid the costs and disruption of reactive repairs. They can also work out how to tune the machinery to optimise its performance. At the same time, they can make sure that all statutory requirements are being met, and they can help protect an asset and its owners from all manner of risks.

Productivity levels are critical. A few hours of downtime can cost millions of dollars. A single drop of spilt oil is a reportable incident. So, effective asset management has become an economic and environmental necessity.

PAM was established in the UK in 2002, and helped on its way with some seed funding from Petrofac. Then, following Petrofac's 2005 listing on the London Stock Exchange, PAM became a wholly owned subsidiary. Now, after more than a decade of consistent double-digit growth, it employs 270 people, of 29 nationalities, located in 11 offices worldwide.

As part of Petrofac's Engineering and Consulting Services business, PAM works on a range of asset performance management assignments. The majority of work comes from a mix of national oil companies, the IOCs and independents, with around a quarter of business coming directly from Petrofac projects and operations and maintenance contracts.

One of its biggest clients is BP, with assignments including the Chirag oil project in the Caspian Sea and both Greater Plutonio and PSVM in Angola. In 2012, BP signed a master service agreement with Petrofac covering maintenance and reliability consulting, execution and training providing a simplified mechanism for Petrofac businesses to engage with it. Through this strengthened relationship PAM won a maintenance build deal for the Shah Deniz 2 project (see page 7 for details).

Alaska, not traditionally a stronghold for Petrofac, is one of the more unusual assignments. BP began operating in Alaska way back in 1959, and now produces more oil than any other company in the state. From its offices in Anchorage, BP manages the Prudhoe Bay oilfield, 650 miles away. It also operates three of its own pipelines, and has a significant stake in the Trans-Alaska Pipeline System. On a day-to-day basis, Steve spends a small amount of his work time at the PAM offices in midtown Anchorage, the rest of it being spent at the nearby BP Alaska headquarters. Once every couple of weeks, he travels up to the Prudhoe Bay oilfields inside the Arctic Circle. One aspect of the contract is to provide full time operations support. Under Steve's watchful eye, four PAM people work on rotations, commuting between the North Slope and Anchorage. Their task is to set out and oversee maintenance strategies, and ensure that everything complies with the US Government's Occupational Safety and Health Administration (OSHA) standards.

As well as enjoying the job, Steve clearly loves the lifestyle. "If you like the outdoors, you should love Alaska," he says. "Like in the UK there are clear seasons, just more pronounced." But he admits it's not for everyone, and tempting new people to join the operations is a challenge. "It is one of the least densely populated places on the planet. Almost every major oil company is represented, but there are less than 700,000 people in the state. So the skills shortages you see elsewhere are writ large," Steve explains.

Of course, Steve and his team aren't on their own. They draw on the capabilities of the PAM organisation and from across the Petrofac Group. They are in daily contact with offices in Houston, where six other consultants are assigned to the BP contract. So, yes, Alaska is a very different place to work. The scale is vast, and the tundra-covered North Slope is often described as the wildest corner of the wildest state in the Union. PAM's job of keeping facilities online, of minimising risks and expenses and managing compliance, remains remarkably consistent – whatever the location.

'People either love it here, or hate it. They seem to struggle through a single season and quickly escape, or settle down and stay forever' Steve Boddy, pictured above

A sound investment

Nicknamed the 'last frontier', Alaska is a sparsely populated land, which stands at the Arctic Circle between Canada and Russia. Its very name, Alaska, is derived from an original Aleut word which means 'the shores where the sea breaks its back' – and in Alaska's case, that's the Arctic, the Pacific and the Bering Sea.

Until 1867, it was part of Imperial Russia. Then the US government bought the entire region for the princely sum of $7.2 million. At the time, it seemed like a lot of money, but within a decade gold was discovered, which triggered the Klondike Gold Rush in the neighbouring Yukon, Canada.

From a hydrocarbons perspective, it turned out to be one of the most resource rich areas of the world – still producing more than 500,000 barrels a day. The US Department of Energy estimates the discovered, technically recoverable natural gas on the North Slope to be about 35 trillion cubic feet.

COVER STORY

FIRST OIL FROM CENDOR PHASE 2

First oil was achieved from Cendor phase two in early September, marking a major milestone in the development of Block PM304.

Petrofac is the operator for Block PM304, which includes the Cendor and nearby West Desaru oil fields, alongside its joint venture partners PETRONAS, Kuwait Foreign Petroleum Exploration Company and PetroVietnam.

The original Cendor phase one mobile offshore production unit has been disconnected, and a bridge linking the phase one wells to the phase two wellhead platforms has been installed.

The West Desaru tie-in to the new Cendor FPSO has been safely and successfully completed. Production from Block PM304 is expected to ramp up in the near-term as the facilities are fully commissioned and new wells are brought on line.

The *FPSO Cendor* was photographed on the day before her sail-away earlier this year. The photograph was taken by one of Petrofac's engineers, Fuad Salleh, who was on site at the time. From the adjacent wharf, with perfect weather conditions and camera shutter alterations, Fuad was able to capture the majesty of the vessel. "I was overjoyed to capture the moment," he says.

ENGINEERING IN FOCUS

‘NOT JUST GOOD BUT GREAT’

‘Good engineers have consummate technical ability.’ says Petrofac Group chief executive officer, Ayman Asfari. ‘But great engineers are also aware of the political, social and economic environment in which they work.’ In these pages, we look at the discipline of engineering today, and the key role which engineers play both within Petrofac and across the wider world

What do an Ancient Greek mathematician, a Renaissance artist and an industrial chemist have in common? It isn’t the start of a geeky joke, but all three have been voted on Twitter as among the top 20 engineering heroes of all time.

Archimedes, Leonardo da Vinci and Carl Bosch were among these popular ‘engineering’ greats, that also included Isambard Kingdom Brunel, Nikola Tesla, Ada Lovelace, Frank Whittle, Tim Berners-Lee and Thomas Edison. The recurrence of polls such as these demonstrate our drive to identify role models in public spheres, which was a theme picked up by Petrofac Group chief executive officer, Ayman Asfari at a speech he gave at the Royal Academy of Engineering (RAEng) to honour the young role models in the making – the Academy’s Rising Stars, which included two Petrofac engineers.

Ayman, who was elected as one of 59 new Fellows of the RAEng in September (see page 6), says: “Good engineers have consummate technical ability; but great engineers are also aware of the political, social and economic environment in which they work. To do all of this requires cultivating a broad set of skills that will not only create great engineers, but also great engineering role models.”

He believes that it takes a much wider skill set to become a great engineer than it did 30 years ago. “Today, engineers need to understand how their part of the project fits within, and adds value to, the whole, and they adapt accordingly to ensure optimum impact,” he says. “This task is particularly acute in the oil and gas industry where extracting hydrocarbons is becoming increasingly complex. As a result, engineers must be able to balance technically and commercially innovative solutions, be responsive to their clients, while at all times maintaining a focus on safety, the environment and local community well-being.”

Newly-appointed president of the Royal Academy of Engineering, Professor Dame Ann Dowling DBE FREng FRS emphasised the societal role of the engineers who were appointed as Fellows: “Our newly elected Fellows bring an enormous breadth of expertise to the Academy, widening our collective scope and knowledge. I know that they will all make significant contributions to the Academy’s activities in their time as Fellows and we look forward to working with them to create benefit for society through engineering.”

It is this breadth of expertise, and the need for creativity that is emphasised by many organisations involved in encouraging a new generation of engineers to make careers in a range of disciplines, whether civil, mechanical, electrical, chemical and computer engineers. This is particularly important at a time when reports continue to outline a growing shortage of engineers in the UK, which could influence the speed and scale of economic recovery.

“A vibrant and growing engineering profession is vital for the long term competitiveness of British industry,” says Ayman. “It is imperative that we have the vision to invest in the next generation of talent by attracting the best and brightest to engineering, and offering them an exciting and rewarding career path.”

He talks enthusiastically about the role Petrofac can play in this area. “This is something we are very focused on at Petrofac, where engineering talent is our core asset – we employ over 7,000 engineers around the globe, we expect to recruit over 300 engineering graduates this year, and we have invested in our own Petrofac Academy to ensure that the professional development of this talent pool is actively managed from the start of their careers,” he says.

“Our continued support of the Royal Academy and its Rising Star Awards demonstrates the value and emphasis we place on developing and recognising the achievements of the next generation.”

Petrofac and the Royal Academy of Engineering

Petrofac has been involved with the Royal Academy of Engineering (RAEng) since 2009.

Petrofac has sponsored the RAEng’s Rising Star Awards dinner since 2011.

Petrofac has sponsored four teacher connectors in the UK, employed as consultants by the RAEng, to help enhance STEM (Science, Technology, Engineering and Mathematics) learning.

Five Rising Stars have been recognised by the RAEng for their exceptional engineering contribution early in their career; Petrofac has sponsored 27 Fellows through the Fellowship programme and eight of them are now employed at Petrofac.

Petrofac employs 7000 engineers globally, delivering projects like Galkynysh in Turkmenistan (left)

ENGINEERING IN PERSON

They may be separated by thirty years of experience, but they share a passion for their discipline, and a vision of its future. Craig Muir, Petrofac's managing director of Engineering and Consulting Services, and Charlotte Davis, a process engineer a few years into her Petrofac career, are united in their drive to see engineering and engineers flourish. *Petrofacts* talks to them both at the Royal Academy of Engineering. Photographs by Phil Sayer

THE FUTURE IN THEIR HANDS

CRAIG MUIR

Craig Muir joined Petrofac as managing director of Engineering and Consulting Services within ECOM in 2012. His responsibilities include the company's engineering service centres in Woking, India, Malaysia, Indonesia, Houston, Algeria and Nigeria as well as subsidiary business, Plant Asset Management (see page 12). Craig previously held the position of executive vice president within AMEC's growth regions covering the Middle East, the Former Soviet Union and Africa; and prior to that, he held numerous roles working in the oilfield service sector including KBR, Brown & Root and AOC International.

Why did you choose a career in engineering?

Charlotte: I've always been interested in science and maths, and during my studies I came across the 'whynotchemeng' campaign set up by the Institute of Chemical Engineering. This gave me an insight into what chemical engineers do and the scale of the projects. It sounded really interesting and a good way to apply my skills and had great career prospects.

Craig: It was a little different for me when I started out. I come from an area in Glasgow surrounded by industries and the shipyards, where engineering tended to be the mainstay. Originally, I wanted to go into the financial industry as I enjoyed that, but I started doing technical and mechanical work for John Brown on their gas turbines: it gave me a glimpse into the engineering side of things and made me see how you can broaden your opportunities.

At that time, manufacturing in the UK was beginning to decline, and our differentiation globally was in engineering and technical delivery. So that was the element that attracted me: engineering could keep us ahead – a 'value add', as we would call it today. Manufacturing was always going to be under pressure, so you had to move up the value chain to succeed.

What happens when you make the transition from school or university to the workplace?

Charlotte: If I'm honest, I was terrified on my first day. When you are at school or university, you study the principles, but once you actually get into work, you realise that it's not just about pure engineering; it's about all the different interactions you have to have with different kinds of engineers and disciplines.

Craig: Exactly. That is one of the biggest challenges we have: we have lots of young engineers coming in with a strong and varied technical bias, but there are so many variables in defining and executing projects that you need more than that. Many engineers starting out have a tendency to come in with the 'answers', but the important shift is to get them asking the right questions. Understanding the technical aspect of projects is the most important starting point; that does give you a broad capability. But the next big step, once they get there – and that's usually when we see them at Petrofac – is, am I asking the right questions to make this a successful project? And once they get to that stage, you see them flourish.

What structures are in place in Petrofac to support that development?

Craig: Things are still evolving. Everyone knows that we're in a period of growth, and we're bringing in many more young engineers and have been putting programmes in place for them. Over the next couple of years, a lot of these people, like you Charlotte, are the pioneers for this next stage of the company. You will be central to our success. For the company, this cannot *not* be successful. That's not an option.

I believe we need a blend of formal structures and encouraging individuals to take responsibility for themselves, both as young engineers and also as mentors. The Petrofac Academy gives us a strong foundation, wherein all incoming graduates are assigned a line supervisor and mentor, but we need to continue to develop mentors. Most importantly, however, you have to take chances on people: you've got to give some of the young engineers coming in just that little bit of push...

Charlotte: Yes. You learn so much more when you're actually on a project and being given a lot of responsibility. As long as you've got someone to guide you, to say 'maybe you should or shouldn't be doing things that way', that really helps.

'These people are the pioneers for the next stage of the company. This cannot *not* be successful'

What is the best route to a successful engineering career in Petrofac?

Craig: The biggest challenge is whether to take the technical route or the management route. Too many people think the management option is the easier one. For me, the important thing is to build the right technical bias in the first three to five years. It's that that creates the foundation for people to do whatever they want. And too many, within a year or two years, want to jump straight to being a project engineer.

Charlotte: I've seen quite a lot of that. I want to stay on the technical side at the moment because I want to become a chartered engineer. I'd like to achieve that within the next year or so, and I feel like I'm in a good position for that, due to the opportunities and responsibilities I've been given. You can manage a lot better if you have a strong technical background.

Craig: Absolutely right. I'm keen on making sure that there is a strong technical core at the heart of all of our young engineers' capability. The other thing which is equally important is to learn about disciplines other than your own. If you're too single-discipline focused, you don't understand how important you are to others, and how important they are to you.

How do engineers work within the Petrofac 'team'?

Charlotte: Communication is key – you need to be able to talk to anyone, to ask the right questions, particularly of other disciplines. At the beginning, you might feel like you don't know your own technical area as well as the people you have to talk to, but you gain more confidence by asking those questions and talking to other disciplines.

Craig: The multi-discipline issue is the key one. You need to be able to think not just in your own discipline, but to be able to work with others in their discipline. That means you've got to be eager to learn. Charlotte brought up a good point: a lot of it is about communication, and being able to disseminate a lot of information and detail. In an environment like ours, you have to be part of a team – you can't just work on your own.

For example, while process engineering may set up a lot of the fundamentals in a project, you also need to interact with mechanical engineers, instrument control, and then piping and the electrical side. If you understand their drivers – what keeps them awake – you can start to address those issues earlier in the design stages and eliminate those issues for them, saving time and money. This 'value' can be unlocked if you have a broad understanding across the disciplines.

Charlotte: Exactly. It's really important to know, at the beginning, the possible impact on others of what you think might be a small tweak or saving.

Craig: What we're talking about is being able to understand the 'constructability' of what you're involved with early on. Sometimes you see designers – because we do everything with computer-aided design these days – place far too much information on a design document. Then, when you actually place it on an A3 drawing, there's too much information for it to be intelligible. For me, the successful engineers of the future are those who can think about the end user right from the start, bringing the end user back into the definition phases of a project.

Charlotte: In the projects I've been involved with, if you have someone from operations in at an early point, the project is usually more successful because that person is actually going to be running it on a daily basis. They are the people to tell you whether something is going to work – outside of the designer's head.

Craig: Computers are great, but our reality is a very practical one – how 'live' can we be during the engineering stages. You have to be able to look at it and feel it – and then you can start to say, we can change this, this and this. A discussion in a room at the right time can save you millions – with just three or four of the right people sitting there.

One final, related, point on this topic: good engineers are also able to take a holistic view, of the total value of the job, rather than just a small section of it, or their own section. This is also what creates the value in a project. Today, we use the words 'added value', which is about finding the value in how you put a project together. Our business is all about safety, cost, time and resource. Safety is always first. Then you get into the cost, the time and then the quality of the people. A lot of engineering is about *how* can you build things, *how* do you put these complex projects together. Ten or twenty years ago, engineers may have spent most of their time on technical calculations. Today, it's a much more challenging environment.

What has changed in the world of engineering? Why is it more challenging?

Craig: It's very competitive, and projects can be much more complex. We're all used to hearing about easy oil and hard oil, but it's more than that. Every project requires the best value return from the actual product you've got. You're always looking to do something more, which increases complexity. And of course, we're working in an international environment, with all the geographical complexity that brings.

Charlotte: Yes...the politics or legislation of the countries we're working in have an impact on how you think about a project from the outset. And the physical environments tend to be more challenging, like the Arctic or the desert: we have to manage extremes of cold and extremes of heat. You're not just thinking: 'how do I design this plant'; you're also thinking about how it's going to fit into where it's going. You might not necessarily put the same plant in America as you would in the Middle East.

Craig: Nowadays, most of our projects are done in an international context – with local governments, local communities involved throughout the process. A lot of the thinking and preparation for a project takes these into consideration right from the start.

Just as importantly, in many countries, we are working alongside national companies to develop skilled workforces: you have to leave something truly sustainable behind, other than a completed project.

Charlotte: I'm working on studies at the moment, and a major driver for the contract is to develop local Tunisian engineers.

Craig: In an area like that, it's about understanding that this is the way things are, embracing that and supporting it. Like everything else, once you do that, other opportunities blossom.

Tunisia is a good example, where we can work with the local industry to create a generation of skilled workers. In some countries, that can take on a regional element where you create even further development capability that supports the business growth.

Oman is also a good example. We have three or four major projects, and it's about developing the capability in Oman for project delivery. In many of these countries in the Middle East and East Africa, they've got very young populations. The industry's challenge is how to get them engaged, employed and flourishing in our businesses, while also retraining the more mature elements of the workforce.

This need for Petrofac to embrace local communities and skills development is also very much reflected in our Academy; our annual intake includes graduates from more than 15 nationalities reflecting the geographical areas in which we operate.

Do you see issues with recruiting and retaining engineers for the future? What about female engineers?

Craig: Nowadays, we're in a 24-hour-environment, and even on television you see engineering jobs taking more prominence – which you never used to see. A lot of this is showing people that complex projects are being engineered and executed successfully. These channels are now helping, whereas 10 or so years ago, people were keen to go into finance and IT or the service industry. In an organisation like ours, we have to keep pushing to be at the forefront of that.

Charlotte: You have to stir up an interest about the opportunities available to young people in engineering. I've managed to travel to Malaysia, Abu Dhabi, Italy; I've been round the UK, I've been on an offshore platform. When I was 13 or 14, I would never have dreamed of doing those sort of things. As Craig pointed out, what's happening in the media is interesting: lots of people have been talking about the Crossrail documentary that's been on the BBC in the UK recently, and those kinds of programmes pique peoples' interest. That one thing can be the spark to make someone look into engineering further.

I think one problem for recruiting engineers, especially female engineers is to do with perceptions – how things are portrayed rather than the reality of the situation. Some young people might think 'oh, I'm going to be in a boiler suit all the time, wielding a spanner', and it's not all like that. I talk to students, explaining that there is much more to engineering. When you get into a place like Petrofac, you don't get treated any differently for being female. I'm still doing exactly the same work as anyone else, and my opinion gets listened to in the same way.

Craig: I agree. For me, the challenge is up to the individual – whether female or male – whether they want to take up the opportunity and where they want to take it to. You get a blend and a balance of different approaches – again, male or female, whether in India or Woking – and what you see is everyone with a voice.

Charlotte: If they're a good engineer, it doesn't matter.

What can Petrofac do to support the development of engineers?

Craig: You've got to give people opportunities so that they can see something different for themselves, for their own futures. You don't want to create 'false promises', but you do want to be able to show people the true diversity of your organisation. It offers opportunities: if you want to take them, you can take them; and for some, who might not want to take them, it doesn't mean you'll fail; it just means that they'll take a different path.

People do want to see young engineers in the organisation, and we have to keep working to make sure we have the right work volume to expose young people to the variety of work they need to build their careers. It's not just about attracting people from universities: you want to give everyone a chance. The diversity in our organisation is that people are from multiple locations and multiple backgrounds. Today, you've got engineers from China, from India, all over the world, all coming into the marketplace so you've got to create some sort of differentiation. A lot of it is finding ways to give young engineers the practical understanding of the project delivery, giving them exposure at site, and more exposure in the office. It's turning theory to practice as quickly as possible.

Charlotte: Yes, once we have that all-important practical experience, we can put that back into our theoretical understanding and make better decisions.

Another important area for me is about the need for Petrofac to keep promoting all of its component parts. Yes, we all work in different business units, but it's always good to know in more detail what is going on outside of your own area. We're a fantastic company, a large company, and those interactions across the different business units could be very powerful. We do so many different things – from training, to onshore, and offshore; and we've got the new large deepwater vessel on the way... It's so important for people to be aware of what's going on: it does help how you feel about the company, and your own career opportunities.

Craig: It's a good point. We are different units inside a larger business. Taking down some of these legacy issues or barriers can be like taking the organisational handcuffs off. I don't think we're that far away from that today... It comes back to what I was saying about the engineer seeing the holistic value of any particular project; if everyone starts to look at projects and opportunities with the holistic value of the company in mind, you can see more options for growth.

What challenges lie ahead for you personally?

Charlotte: In the short term, I want to keep developing my technical skills and gaining more interdisciplinary knowledge. However, the next milestone for me is to become chartered so that I'm one step closer to being a senior process engineer.

Craig: The challenge for me is that we're going to become a larger organisation over the next three to five years, and we have to make sure we have this strong foundation or network of capability that allows us to execute projects.

If we can build a cadre of engineers who have a breadth of understanding of disciplines, engagement with project delivery, and an ability to always keep the end user in mind, then we have created a differentiated platform for the long term, that enables our clients and our staff to flourish.

'You have to stir up an interest about the opportunities available to young people in engineering'

CHARLOTTE DAVIS

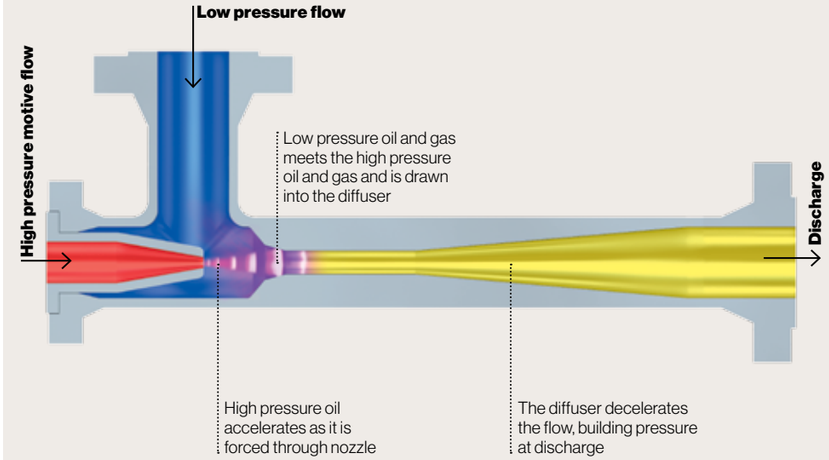
Charlotte Davis is a process engineer in the early stages of her career in Petrofac. She has five years' experience, including work on the company's major projects in Abu Dhabi and the North Sea, as well as a process internship working for BP as part of her degree. She completed her MEng (Hons) Chemical Engineering at the University of Bath in the UK, and is an Associate Member of the Institute of Chemical Engineers (IChemE).

ENGINEERING IN ACTION

FLOW MOTION

Unexpected use is the rule, not the exception when it comes to technological advances. This *Petrofacts* 'technology timeline' – at the heart of which is what many of us may think of as a simple nozzle – lends weight to that rule.

Over centuries, the number of uses that nozzles and jet pumps are put to, demonstrates how one advance, whether in scientific theory or technology application, can have wide-ranging consequences. Caltec, the Petrofac-owned fluid dynamics company, applies its own surface jet pump and compact separation expertise and solutions to enhance oil and gas production. The technology itself is passive: it has no moving parts, requiring simple controls and maintenance, with the laws of mathematics and physics working in harmony inside patented designs. The company has been working with most oil and gas majors to apply or retrofit these technologies for a broad range of efficiency gains.



HOW IT WORKS

The surface jet pump is at the heart of Caltec's production solutions. The device uses the energy from a high-pressure fluid to boost the pressure of a low-pressure fluid to an intermediate level. In studying the science behind the pump, the company's fluid dynamics specialists have made improvements to its design and performance as well as extended its range of applications. Uses include production boosting; multi-phase boosting; gas/liquid separation; flare recovery; de-gassing liquids; and oil/water separation. There are more than 105 applications in use, extending the life of assets, increasing productivity and profitability, and helping to meet environmental obligations.

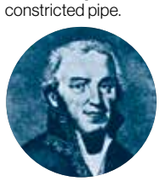
TECHNOLOGY TIMELINE

1738

Swiss scientist Daniel Bernouilli publishes his book, *Hydrodynamica*, in which he outlines a principle which states that as fluid flows through a pipe with a constriction (nozzle), the fluid must speed up, reducing its pressure and producing a vacuum.

1797

Italian physicist Giovanni Battista Venturi outlines the so-called 'Venturi effect' – the reduction in fluid pressure that results when a fluid flows through a constricted pipe.



1852

William Thomson (Lord Kelvin) works with James Prescott Joule on what becomes known as the Joule-Thomson effect (throttling process). This is at the heart of thermal machines such as refrigerators, heat pumps, and liquefiers.

1858

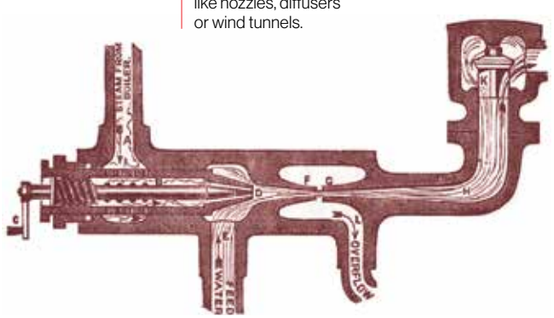
French engineer, Henry Giffard, invents the steam injector which is an early form of the jet pump. He was seeking a solution to the problem of feeding liquid water to replenish the reservoir of steam-engine boilers. His is one of 72 names engraved on the Eiffel Tower.

1860s

The injector is originally used in the boilers of steam locomotives for injecting or pumping the feedwater into the boiler.

1887

Austrian physicist and philosopher Ernst Mach is the first person to record the nature of supersonic flow and shock waves. The Mach number is used both with objects traveling at high speed in a fluid, and with high-speed fluid flows inside channels like nozzles, diffusers or wind tunnels.



1890

The de Laval nozzle is developed by Swedish inventor Gustaf de Laval for use on a turbine, the wheel of which is turned by jets of steam. He develops a nozzle (later used in modern rocket engines) to increase the steam jet to supersonic speed.

1889

An additional use for the injector technology is found for vacuum ejectors in continuous train braking systems, which were made compulsory in the UK in 1889.

1910

Leblanc introduces a cycle with a vapour jet ejector. It produces a refrigeration effect by using low-grade energy. Since steam is widely available at the time, the 'steam jet refrigeration systems' become popular for air-conditioning in buildings and railroad cars.

1926

American physicist and inventor Robert Hutchings Goddard is credited with creating and building and launching the world's first liquid-fuelled rocket, using modified de Laval nozzles.

SCIENCE PHOTO LIBRARY (6)/ MARY EVANS (1)

1933

A consistent mathematical representation is published that includes suggestions for pumping oil wells with liquid-driven downhole jet pumps.

1947

The Sputnik satellite launch marks the birth of space travel.

One of the UK government's Research Associations, the BHRA (British Hydromechanics Research Association) is established to extend the knowledge of scientific principles to hydraulic machinery. Its initial aim was to meet the needs of British pump manufacturers by addressing generic problems in pumping technology. Caltec would later become a spin-out company.

1949

Widely used Lockhart-Martinelli two phase flow pressure drop equation is published.

1950s

Water or steam driven ejectors are used to provide emergency cooling water to nuclear reactors. The advent of nuclear power technology results in a number of fundamental ejector research studies during the second half of the 20th century.

1957

R G Cunningham develops liquid jet pump theory and performance predication.

1986

Caltec forms as a division of BHRA.

1996

Caltec advances multiphase flow surface jet pump concept, creating the Wellcom System, later completing live oilfield trials in Italy for production boosting.

1998

Caltec wins the Royal Society's gold medal and award for contribution in advancing science and technology, working at the forefront of applying surface jet pumps and cyclonic separation to make oil and gas production more efficient.

2001

Caltec adapts supersonic surface jet pump design and theory for stable performance under fluctuating operating conditions. It designs, builds and deploys the world's largest supersonic production-boosting SJP offshore, named 'Monster Jet Pump'.

2004

Caltec wins the World Oil Award in the US for best production solution for the 'Monster Jet Pump' which enables significant production increases and de-bottleneck processes.

2008

Petrofac buys Caltec.

2014

Caltec solutions are in use in more than 100 oil and gas projects around the world.

BIG PICTURE CYGNUS

The Alpha wellhead platform is the first of four platforms to be installed on the Cygnus field, the largest gas discovery for 25 years in the Southern North Sea.

Petrofac was originally chosen by operator GDF SUEZ E&P UK in 2011 to provide operations and maintenance and engineering services support on the Cygnus and Juliet fields – a relationship that was extended this year to cover all its operations in the UK Continental Shelf.

The topsides weigh 1,640 tonnes, and at 23 x 23 x 10 metres in size, took 16 months to build, at the Heerema yard, Hartlepool.

The field, operated by GDF SUEZ E&P UK and its partners Centrica and Bayerngas, is expected to account for 5% of UK domestic gas production, coming on stream late in 2015.

Cygnus will have two production centres. The first is a central hub with three bridge-linked platforms (Alpha); the second is a satellite wellhead platform (Bravo) that will tie back to the Alpha complex. Gas will be exported from Cygnus, via new and existing subsea infrastructure, to the Bacton Gas Terminal in Norfolk.

DOUBLE VISION

SAFE HANDS

Petrofac's three-day 'HSSE Bootcamp' training courses are being delivered globally to project team leaders at every site. *Petrofacts* talks to a trainer and a trainee to find out how these sessions are delivering safety training in a radically different way

MOHAMMED AWAD HSSE ADVISOR, SHARJAH

"Safety culture on sites is generally good, but our goal at Petrofac is zero accidents and we can always do more. We know HSSE people are often viewed as the 'enemy', or a barrier to getting work done, but there is an inter-dependency between sites and HSSE. Working together, the culture completely changes and the number of accidents and incidents go down, drastically.

People ask me; 'I am not in HSSE; why am I here?' And I tell them that this course is not for HSSE people, it's for non-HSSE people. Bootcamps are for managers and team leaders, those who take decisions onsite. Safety's biggest enemies are schedule and cost, but we need project managers to see that safety compromises leading to an incident will very often incur delays and cost increases anyway, so everyone ends up worse off. And it's a person's life at the centre of it all, and you can't mess around with a person's life.

No one stays sitting down for longer than 40 minutes on these courses. On day one, I let people sit where they want; once I see the dynamics and existing relationships, I divide people into groups and have them competing. People naturally sit with people they like. I sit them with people they might *not* like, because good safety culture means breaking down barriers between people.

Studies show that 97% of all accidents are due to human error, so most of our modules are behavioural based. I might ask individuals to deliver a toolbox talk to everyone else, and I have some special tricks to see how effective the talk is, and how effective the speaker *thinks* their talk is. Some people have been doing toolbox talks for 20 years or more, and they are shocked when they see the results of this exercise. No one must ever assume anything in safety.

It only takes one unsafe act and the fall of the dice means someone's life could be changed forever. Depending on attendees' roles, I ask people to perform a straightforward task that they say they have been doing for years. People do the task without thinking and without even checking equipment first, and are shocked to realise, 'I shouldn't be doing this'. No one is above HSSE discipline, and people's mentality changes over the three days.

We test previous safety knowledge in whatever discipline people are from, and we keep testing what they've learnt in each session. Chocolate is always a good incentive for people to sit up and pay attention, particularly when the groups are competing! I like to call it the Hunger Games.

These courses are different, they are tough and they are fun. The feedback I get from people who've worked in the industry for years, is that they've never experienced anything like it."

'Safety's biggest enemies are schedule and cost'

GHASSAN MOUFARREJ SENIOR CONSTRUCTION MANAGER, ZADCO SITE, ABU DHABI

"I think the view of safety onsite in the oil and gas industry has changed a lot over the years. There was a definite view that the only people with responsibility for health and safety were the health and safety advisers, that they would police us, and we would hide things from them.

Now, I think people realise safety is also the responsibility of everyone working in construction, because they are the ones doing the job. People understand how important it is to get the job done safely, both for individuals, for their families, and for the company and its reputation.

As construction manager here, I attended the bootcamp course in June 2014. We have a lot of training courses and, sometimes, you do ask yourself, 'Why do I need another one?' I do think every training opportunity is a plus, even if it gets 10% extra out of you.

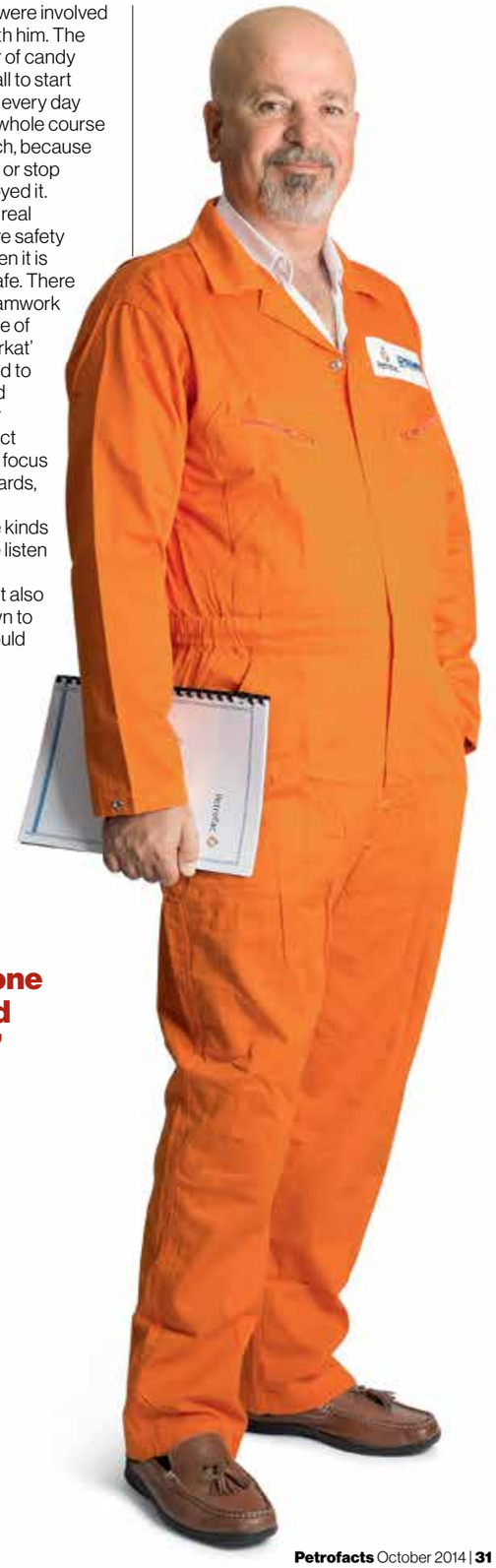
The title of this course, 'Boots on the Ground' made me think it was for supervisors, not for managers. But I attended nevertheless, because I would like to coach our supervisors here to help them to do their job more safely. There was a lot that refreshed my memory, and gave me additional knowledge and experience.

I really liked the way Mohammed delivered this course. It was certainly not like a lecture. He gave us examples, he set us exercises, and we were involved and sharing the sessions with him. The incentives he gave, like a bar of candy for winning teams, were small to start with, but the bars got bigger every day to keep us on our toes! The whole course had a very effective approach, because no one had time to be bored or stop paying attention. I really enjoyed it.

To be safe onsite requires real teamwork, because if you are safety aware and others are not, then it is difficult to perform and be safe. There was a great emphasis on teamwork here, particularly through one of the videos we saw, the 'meerkat' video, showing how you need to work together to be safe and survive, watching for danger and hiding together, to protect everyone. There was a lot of focus on how we can mitigate hazards, using an example of a lion escaping in a zoo, and those kinds of things really made people listen and pay attention.

This course was useful but also a lot of fun, and this was down to the trainer's personality. I would recommend the bootcamp, especially for supervisors. I think everyone, even if they feel negatively towards HSSE courses generally, could get something from this course – and it could be the difference between someone going home and not going home... "

'It could be the difference between someone going home, and not going home'



The Rock Doctors: they use an extraordinary mix of computer visualisation, science – and detective work – to try to gauge the hydrocarbon resources held deep underground. Helen Campbell reports.

Photography by Phil Sayer, Ian Teh and Rodrigo Ceballos

THE DEPTHS OF IMAGINATION

Subsurface is a scientific discipline like no other. Unlike mechanical engineering which deals with tangible pieces of steel, subsurface capability is all about interpreting vast amounts of data to 'see', or imagine, what cannot be seen. Subsurface interpretation is the ultimate scientific art, where the wrong judgement means that valuable hydrocarbons stay trapped underground forever. But also an art where getting it right unlocks the full potential of the reservoir and makes a huge difference to the project economics.

The discipline is often viewed as the 'creative' side of science, and reservoir specialists certainly produce complex and colourful visualisations of what lies underground. To the untrained eye, these images may mean little, but to a subsurface specialist they tell the reservoir's past and future story. These visualisations are the difference between a reservoir producing oil at a healthy rate for 25-plus years, or petering out five years after an expensive new production facility has been installed.

Geologists and geophysicists use their training and experience to determine how the reservoir is likely to look and how it may perform, and base their judgement on the data from the drilled well, the extracted well core and from seismic surveys – giant 'ultrasounds' of the earth covering hundreds of square kilometres.

They use this data to build up a 3D picture of the subsurface. Only a part of any reservoir can ever be seen in this way and subsurface specialists do their work with a combination of mathematics, experience and imagination, keeping an open mind as to 'the life story' of the reservoir and how it was first created millions of years ago. Every time a well is drilled, the subsurface models are reviewed and updated with the new information.

Once the geoscientists have defined how the reservoir could look, reservoir engineers then determine the best way to 'drain' the hydrocarbons. Using complex calculations and computer simulations, they assess the fluid trapped inside the reservoir and how easily it is likely to flow through the porous rock.

Often, they will need to look at ways to boost the flow by injecting either water or gas into the reservoir. By assessing the interactions between fluids and the pore space they flow through, reservoir engineers are able to draw conclusions of potential recovery rates from the field.

Armed with a wealth of data, and supported by petroleum engineers who specialise in hydrocarbon behaviour as it flows through the well, all the subsurface disciplines interact to prepare a field development plan – the blueprint for a field's life. The plan looks at ways to extract maximum oil and gas in the best and most commercially-sustainable way.

The company's subsurface group has its origins in the Ohanet project in Algeria in the late-1990s and in work Petrofac was doing five years later on projects in Malaysia, the North Sea and Tunisia. Today, it has grown substantially as the company has taken on more of the upstream risk associated with field developments, becoming a licence-holder in addition to acting as operator.

"Having this in-house subsurface capability is critical to many of the business decisions that Petrofac makes, particularly with regards to later-life assets," says Ian Beck, chief reservoir engineer. "People in subsurface have always built models of physical reality, but the most important models are the conceptual models that you build in your mind, as these are the ones that guide investment decisions. Understanding the subsurface gives us peace of mind and confidence that we are investing wisely, and it is an important part of our assurance process if we are going to put our money at risk in field developments."

Over the last several years, Petrofac has built a team of 120 specialists inside its Integrated Energy Services division, working across assets, particularly in Mexico and Malaysia, and in the Woking Technical Centre in the UK.

Jason Ewles is vice president for subsurface development. He explains: "Petrofac has built a breadth and depth of subsurface capability which is commensurate with the investment programmes it is undertaking. Each asset has developed its own technical skills pool – for example more than 50 people in Kuala Lumpur – and we are building the expertise further. Subsurface skills are a valuable resource that can help open up further upstream opportunities for us."

The subsurface team includes subsurface leads, reservoir engineers, geologists, petrophysicists, stratigraphers, geophysicists etc. Petrofacts *talked to some of the team about their work and its importance to Petrofac ... and to see if any of the common myths about 'rock doctors' are true.*

Emeline Chong

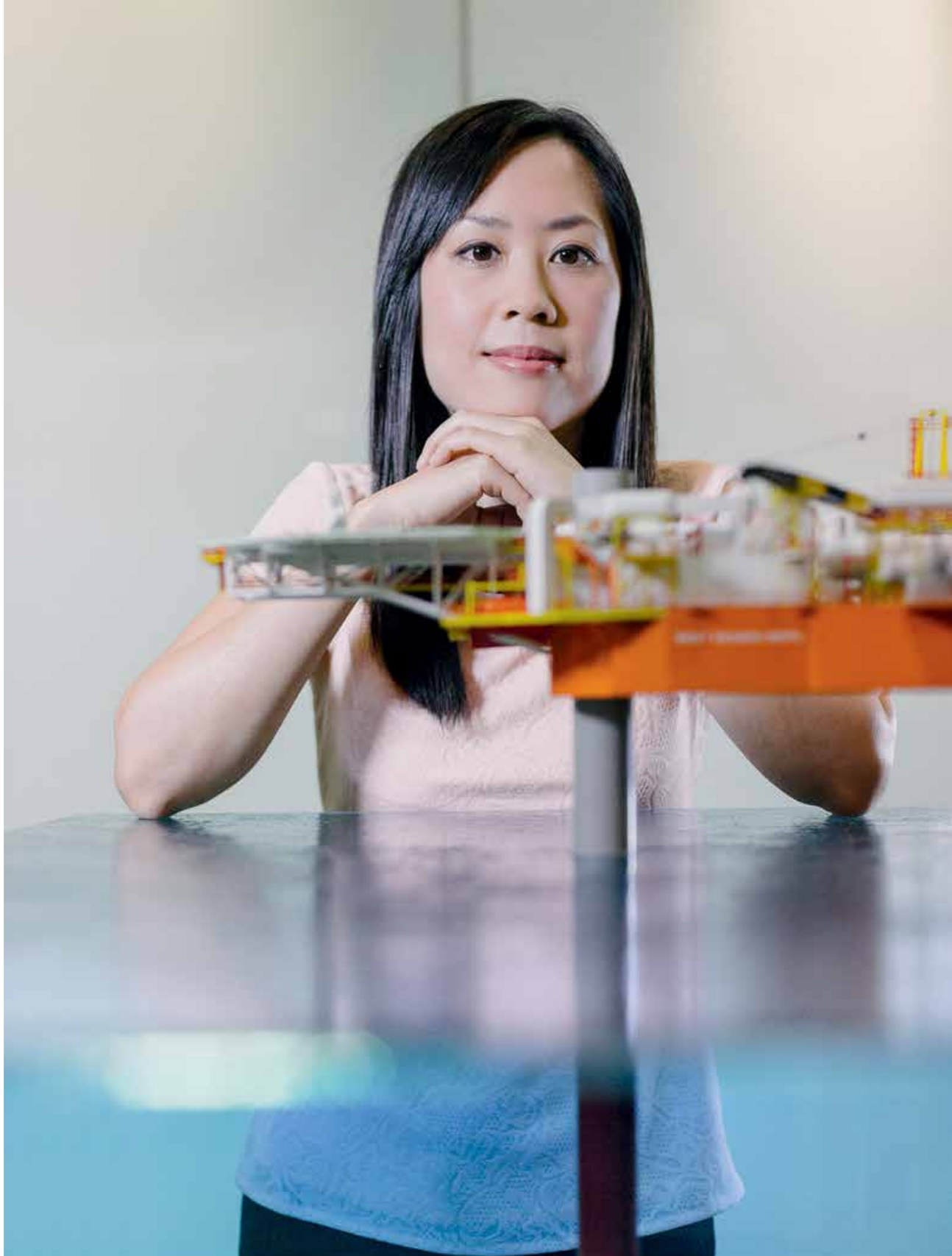
Emeline is a reservoir engineer and subsurface team lead for West Desaru, based at Petrofac's Malaysia office. She says her decision to enter this field was driven by the importance of energy to the world. "The global aspect of the business offers unlimited possibilities and a chance to meet fascinating people," she says. "Plus, I have always been attracted by the lure of technology and adventure that comes with the job!"

Emeline likens subsurface professionals to detectives. "Most of the time, we can't 'see' what is really going on thousands of metres below sea level, so we gather and examine 'clues' from the available data and then work out the right methods to acquire more data, and to do it in the most cost-effective way," she explains.

"As real-time data comes in, we compare the results with our prognosis; sometimes it provides another clue for us to solve the puzzle, but other times, it opens up more questions. The connection to 'value' for the upstream business is immediate, and it is very rewarding to be able to contribute directly to the company's growth."

'It's great to see how we all come together to get the best out of the reservoir'

The teams in Malaysia work on offshore reservoirs located within the Berantai, West Desaru and Cendor fields. Emeline explains: "There are more than 50 of us here in Kuala Lumpur, with various areas of expertise and various levels of experience. But it's great to see how we all come together to get the best out of the reservoir."



‘We are working with what we cannot see; it’s necessary to have imagination’

Oguer Acevedo

Oguer, from Mexico, usually works as a petroleum engineer, sometimes acting as an operational reservoir engineer as needed. “I love this discipline because we are looking at the beginning of the long process that forms petroleum,” he says. “Subsurface is exciting because it is the challenge of the unknown, we are working with what we cannot see directly and it is necessary to have a lot of imagination.”

He is involved with the Magallanes and Santuario fields, the first contracts awarded to Petrofac in Mexico. “The subsurface has no limit; you can think you know everything about a reservoir, but it always will surprise you... I feel very committed to this work because we are working towards one goal: to produce oil from mature fields, following one mission. It’s a big responsibility to be doing this kind of work for Petrofac.”

Like many of his colleagues, he has a ‘favourite rock’. “I love pyrite,” he says, “because it looks geometrically perfect and also because it ‘cheats’ people when they look at it – its popular name is ‘fool’s gold’”.

Vincent Sheppard

Chief geophysicist Vincent has a 25-year career in the field.

“There are so many unknowns in this field. As geoscientists, we draw conclusions and comment on the likelihood of finding a particular thickness of a reservoir. Understanding the ranges of uncertainty in the subsurface is important in our job. We are always asked to quote the smallest a reservoir could be and the largest it could be,” he explains. “The moment of truth comes only when the well is drilled.”

Vincent says that one of the qualities a geoscientist needs is the ability to learn from mistakes, to speak up when you’re not sure, and to say when more data is needed.

Getting the right data is critical, and a lot of time and resources are spent collecting the best geophysical data available. “But what really makes a difference is the know-how that goes into interpreting and analysing that data. And this is where subsurface specialists come in. We continuously learn through our whole career; the more experience we get internationally, the more topography we see, the more we understand, the more we question and we become better geoscientists.”

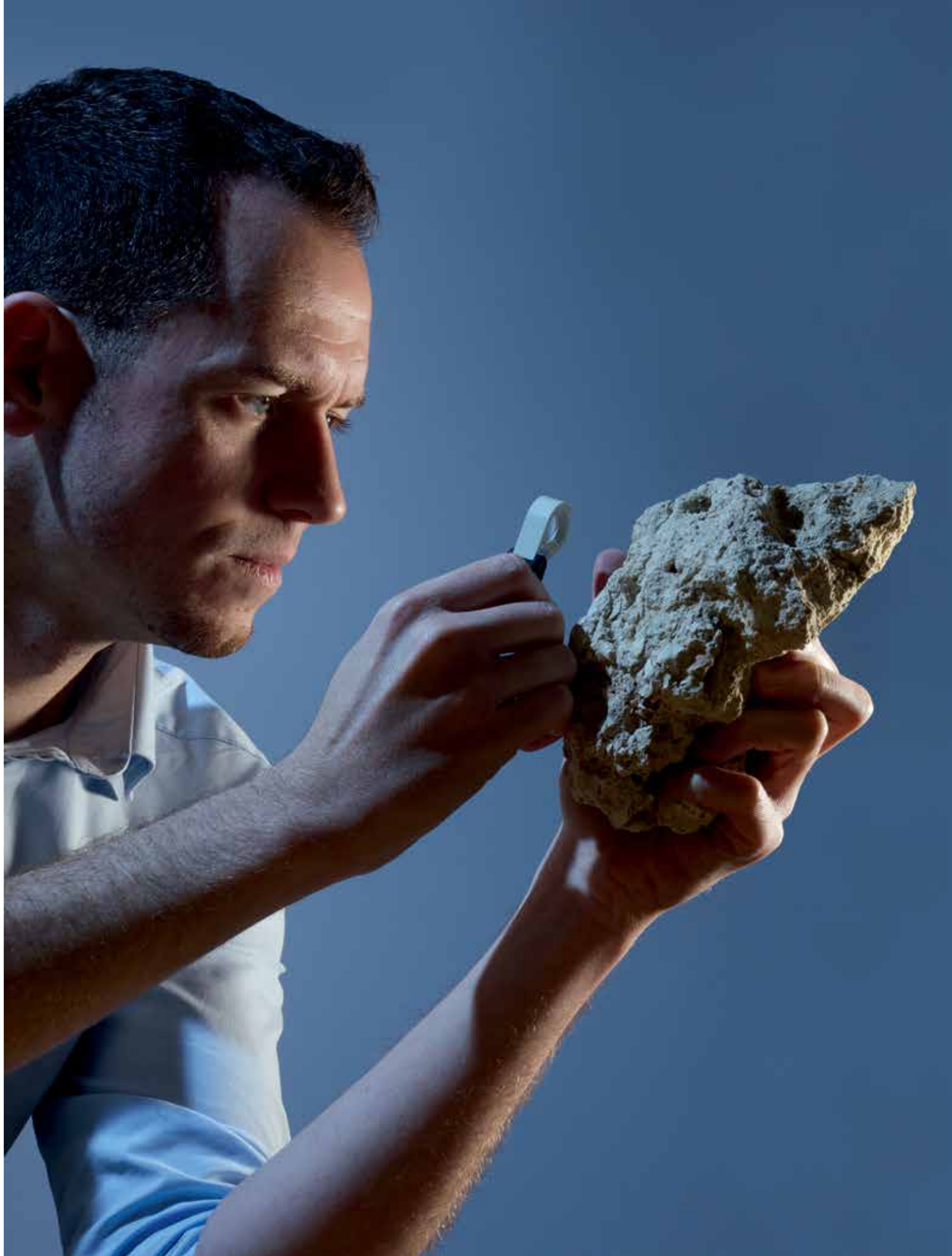
‘What makes a difference is the know-how that goes into analysing data’

James Harpin

As a geologist in Woking, James works in the part of the team that looks at the reservoir to estimate the volume of hydrocarbon within it. His enthusiasm for the subject started early: “I really enjoyed natural sciences at school, studying subjects like plate tectonics, and when I saw the film *Jurassic Park*, I was hooked,” he says.

Today, his work is serious business. “The work we do here applies to our existing assets and to new business, and it’s rewarding to see how it helps Petrofac make investment decisions. For example, we are planning to drill one of our reservoirs in 2015 to boost production. The subsurface specialists will lead the well selection and planning stages, and we will be working closely with our colleagues in drilling. It will be a multi-team effort and a costly process – drilling projects such as this one cost tens of millions of dollars.”

James can’t help but keep a look out for interesting geology. “The big kid in me still thinks that volcanoes are cool,” he says. “I’ve visited a few dormant ones on my travels, including the one in New Zealand that was used in *The Lord of the Rings* films.” He even admits to knowing a geology joke: “What did one tectonic plate say to the other? ‘Sorry I bumped into you, my fault.”



Hazel Clyne

Also a geophysicist, Hazel joined the Woking subsurface team in 2013.

"It's absolutely fascinating to be able to pan through a three-dimensional seismic volume and 'see' the subsurface. You can even pick out ancient river channels that flowed over ancient topography millions of years ago," she says.

"The technology in this industry is incredible," she adds. "But technology can't do everything; being able to incorporate a range of data to delineate the reservoir is essential in a subsurface role."

Subsurface specialists have an in-depth knowledge of minerals and rocks, so they are often on a lookout for rare pieces. "My rock collection is diverse," says Hazel. "I have samples such as Alaskan copper ore, Hawaiian lava and Scottish granite – they are all so different.

"My favourite is called snowflake obsidian, a black volcanic rock with white snowflake-shaped crystals within it. It's beautiful and reminds me of winter. I climbed Kilimanjaro recently, and I was the person weighing myself down with heavy rocks in my backpack..."

'The technology in this industry is incredible. But technology can't do everything'

Lorenzo Sanchez

Lorenzo is a geophysicist in Mexico, specialising in the interpretation of seismic data. His current work involves interpreting seismic to characterise the reservoirs of fields including Santuario and Magallanes.

"Through the integration of data of the subsurface disciplines of geology, petrophysics and reservoir, we select the best areas that have less risk and work to describe the opportunity through an estimate of the volume of hydrocarbons that we could find in that selected location," he says.

He also has a rock collection: among them are rocks and minerals, including a geode from Hidalgo, Mexico; a desert rose from Coahuila, Mexico; and a Paleozoic Ammonite from England that he was given. The geode is his favourite because of the way its crystals flash and reflect when lit by the sun.

"It is highly satisfying to see the achievements of your work in this field, when you see all the teams that influence the process chain moving to deliver the final product, and in the energy sector that is, of course, the oil. I feel very proud to know that the work we do in Mexico helps Petrofac take better business decisions, and contributes to the growth of the company."

'I feel proud to know that the work we do contributes to company growth'

Rosa Uribe

Rosa works out of Petrofac's office in Mexico, and has a background in both geophysics and geology. She says that subsurface work is exciting because it helps us 'know' the Earth and what is under the surface of 'our amazing planet'.

"It helps us find minerals, from gold or silver, to lead and non-metallic minerals too, as well as water, oil and gas, of course," she says. "This work means we have the power to see into the Earth and I love it. The most exciting moment in my career occurred during a field trip in Hidalgo. It was a breathtaking place and we knew we were the first people to go there in hundreds of years. The sun made the mountain look like gold... then a huge wall of rock broke away right in front of us. Climbing mountains and understanding how they were formed is even more fascinating when it happens before your eyes!"

Today, Rosa is leading a multidisciplinary team working on Arenque – an offshore field in the Gulf of Mexico. The team is evaluating new leads and drilling opportunities. Rosa enjoys the challenge: "We have an opportunity to give the field a second life as we work out how much more we can still get out of the ground."

I ALWAYS CARRY... FIRE TRAINING REMOTE CONTROL

Lindsay Flett is fire team leader at Petrofac's fire and emergency training facility in Montrose, Scotland. This device gives him safe and instant control of the training environment

This remote control device is an essential component in my line of work when we are delivering training in our newly installed advanced fire training module.

It is a wireless device that allows our instructors to control many different functions of the module, ensuring that our delegates receive fire and emergency training that is as credible and realistic as possible.

Using the remote, we can ignite and control 'clean burn' fires at the touch of a button. And we can control the lighting, smoke and ventilation to create the exact conditions required for the exercises our trainees are undergoing.

The original Montrose Fire Training Centre was set up in 1978, but has recently undergone a £1.5 million upgrade, reopening with brand-new facilities in April of this year. We provide training in pressure, spill and liquefied petroleum gas fire-fighting techniques to offshore and onshore emergency response teams and industrial fire brigades.

Our eleven specially-designed modules closely replicate the systems and equipment found on facilities and installations, and our industry experts can provide realistic link-ups between emergency management simulators and fire and gas simulation, including night-time fire-fighting.

The addition of our new advanced modules ensures our centre remains one of the most cutting-edge fire training centres in the world.

If you have an item which you take to work every day, which says something about you and your work, let us know, at petrofacts.editorial@petrofac.com

WHERE WE WORK
RABAB HARWEEL

One hundred and fifty people were invited; one hundred and fifty people came. The entire Rabab Harweel Integrated Project (RHIP) team were photographed in the auditorium of Petrofac Tower One in Sharjah in September.

This is a joint team from Petroleum Development Oman (PDO) and Petrofac who will work together for four-and-a-half years on the $1 billion engineering and procurement project for RHIP located in the Harweel cluster of oil fields in the south of Oman.

The project includes sour gas processing facilities and associated gathering and injection systems and export pipelines. It will handle the production of oil and gas from the Harweel oil reservoirs via miscible gas injection and the production of gas with condensate from the Rabab reservoir through partial recycling of sour gas.

Photograph by Celia Paterson

Robbie Neilson, head coach of the Edinburgh-based Heart of Midlothian Football Club

TRAINING: OFFSHORE AND ON THE PITCH

'Petrofac' is the latest name on the lips of Scottish football fans, following the decision by Petrofac Training Services to sponsor the 2014-15 Petrofac Training Cup (originally the Challenge Cup). Clubs regard the knock-out tournament as a great opportunity to 'blood' youngsters and give them vital competitive experience

On the face of it, a professional football club like Heart of Midlothian FC would appear to have little or nothing in common with the new sponsor of Scotland's Challenge Cup, Petrofac Training Services.

But these two diverse organisations are, in fact, united by a shared goal – the creation and delivery of high quality training programmes which equip people with the skills, knowledge and experience they require to perform a variety of demanding roles to the best of their ability.

For the last 30 years, Petrofac Training Services (PTS) has been a market leader in the provision of safety, survival and emergency response training courses for the North Sea oil and gas industry. From bases in Aberdeen and Montrose, a top team of instructors, many with more than 20 years of experience, pass on their knowledge to thousands of customers every year, from the first-time entrant through to the most experienced offshore operator.

Workers with no previous offshore experience undergo Petrofac's three-day course known as BOSIET (Basic Offshore Safety Induction and Emergency Training), or what those of a certain vintage would refer to as 'offshore survival training'. There's also a course called MIST (Minimum Industry Safety Training). Both of the courses equip people with the mandatory skills and knowledge to be able to go offshore.

Meanwhile, back onshore in the Scottish capital of Edinburgh, Hearts FC are hard at work on a youth development programme which is the envy of many clubs throughout the country. The focus is firmly on the identification, and nurturing, of young emerging talent.

Robbie Neilson is the head coach of Hearts. The 34-year-old knows what it takes to perform at the top level, having made 200 appearances for the club during a distinguished playing career which saw him capped by the Scottish national team in 2006.

The future of Scottish football, he says, lies in youth development: "Clubs like Hearts can't afford to buy world class talent so we need to develop our own."

Competitions like the Petrofac Training Cup are to be welcomed, he says, because in such a busy, crowded season they offer clubs the chance to pitch young players into competitive one-off matches. "The young lads gain invaluable exposure to the first team environment," he says of such games. "They get a good idea of what it takes to do well."

His club has been running a successful Youth Academy for the last 10 years. From the outset, the focus has been on identifying, coaching and developing young players, particularly those who have the potential to progress to the senior ranks.

The Hearts Academy operates from Heriot Watt University's Riccarton campus on the outskirts of Edinburgh, where behavioural development is considered just as important as the acquisition of technique. Robbie says there are certain traits he and the club look for in youngsters. "A willingness to work hard is essential, along with a hunger to learn and develop, to achieve personal growth," he says. "We'd rather people made mistakes and learned from them than avoid trying, or committing to something. We also look for our youngsters to be respectful of the club and what it stands for."

Academy members aged 16 or over are offered the opportunity to gain a Scottish Vocational Qualification (SVQ). Programmes include an employment qualification, an 'early touches' coaching qualification, volunteering opportunities and work placements. The club sits down with each youngster and their families to discuss the most suitable option.

Hearts are also developing plans to produce their own coaches. "Some players might not reach their full potential for a variety of reasons," says Robbie, "so we want to offer them an alternative way of contributing to the future success of the club."

Ultimately, however, the goal of every player is to be picked for the first team. Hearts are presently operating with a youth squad of 18 players, all but two of whom have come from the club's Academy. The youths train with the senior squad on a daily basis.

Laurence Milne of Petrofac

"We're looking for evidence that the young players can handle the step up to the senior team," says Robbie. "Training with the first team shows them the levels of skill and physicality required to make it in today's game."

His comments echo the sentiments of Laurence Milne, head of business development at PTS. Speaking at the announcement of their sponsorship of the Petrofac Training Cup, Laurence said, "We see a clear link between ourselves and the Scottish Professional Football League, in our shared commitment to excellence.

"If you want to be the best, whether that's on the field or offshore, then you have to train with the best."

Robbie describes the Academy as the future of Hearts. "The youngsters that we have coming through over the next decade will drive our club to the next level. The results of the first team might always set the immediate tone, but the Academy's development of young players is the way forward."

Action from the match between Falkirk and Dunfermline Athletic in the 2014/15 Petrofac Training Cup. Hearts' involvement in the Cup ended on 20 August with a 4-1 second round defeat at the hands of Livingston. Speaking to the media after the match, Robbie said: "We had five debutants starting and gave debuts to seven apprentice players in total. It's a great learning curve for the young lads. We used the Cup as a chance to give the boys experience of competitive matches." He added that he'd learned far more from the Cup tie by playing his youngsters than he would had he selected his favoured side.

LOGIC PUZZLE

WHAT'S THE PASSWORD?

Can you work out the solution to our logic puzzle – and win yourself a prize?

A staff member went in to work, only to find that he could not log on to his computer. His password wouldn't work. Then he remembered that passwords on this system are reset every month for security purposes.

So he called IT support, and had this conversation:

Employee: "I'm sorry, but I can't log on to the system. My old password is out of date."

IT support: "Yes, that's right. The new password is different, but if you listen carefully you should be able to work it out. It has the same number of letters as your old password, four of the letters are the same, and of those four, two are repeated."

Using that information, the employee was able to log on. What was the new password?

Bonus: What was his old password?

For your chance to win one of five Apple iPod Shuffles, please email your answer to petrofacts.competition@petrofac.com. Closing date for entries is 15 January 2015.

DAVID BISKUP

OUR SUMMER ISSUE COMPETITION WINNERS

The answer to our previous logic puzzle, and the lucky winners of both of that issue's competitions

The June issue of *Petrofacts* contained two competitions for which we received hundreds of responses. The lucky (and clever) winners of the logic puzzle are: Siddhi Sawant, Mumbai, India; Fran Heathorn, Oilennium, Norfolk, UK; Richard Wood, Woking, UK; Guillermo Perez, Tampico, Mexico; and Gorav Joshi, Haryana, India.

The solution to the puzzle is as follows: open the box labelled 'Bolts & Screws', and take out a single item. Since you know the box is labelled wrongly, whichever item you remove must be the entire content of that box

Assume it's a bolt. Then that must be the box of bolts. You know that the other two boxes are labelled wrongly. But one has to contain only screws.

In order to be labelled wrongly, the screws can't be in the box labelled "Screws"; so they must be in the box labelled "Bolts". And so the mixture of bolts and screws must be in the box labelled "Screws".

(Or, if the item you take out of "Bolts & Screws" is a screw, you know that must be the box of screws; and for the other two boxes to be wrongly labelled, the bolts must be in the box labelled "Screws", and the mixture of bolts and screws in the box labelled "Bolts".)

We also asked you to 'Spot the H_2S monitor'. The eagle-eyed spotted two other H_2S monitors in the issue: on page 14 in the story on Oman training, and on page 26 at the Sajaa gas plant. The winner is Devarajan Pradeep Kumar, Sharjah, UAE.

AROUND THE GROUP

READING MATERIAL

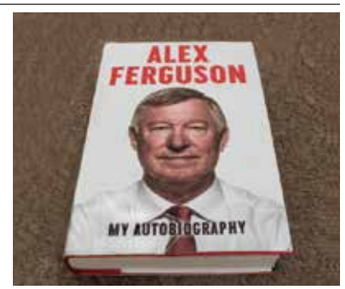
From books to magazines, from biographies to business websites, the material which Petrofac employees across the world choose to read in their spare time are as varied as the people themselves...

Sharjah
Jayesh Gandhi
I love to read books on travel. But I also love to read about business and money markets. I am from Ahmedabad, India, where we are known for being entrepreneurs – so business is in our blood!

Singapore
Magdalene Samuel
From a young age I have loved *Reader's Digest*. It transports me to a world of technology and true-life stories. How apt is Edmund Burke's quote, "Reading without reflecting is like eating without digesting."

Malaysia
Steve Piscina
I enjoy reading books about the area I'm in: when in Moscow, I learned about Soviet culture by reading *Master and Margarita* by Bulgakov, and another favourite was *Don Quixote* when in Madrid.

Woking, UK
Nikil Kadyan
This is an inspirational story about a boy who grew up in Glasgow's shipyards and retired as the most successful manager in British footballing history. He endured tough challenges.

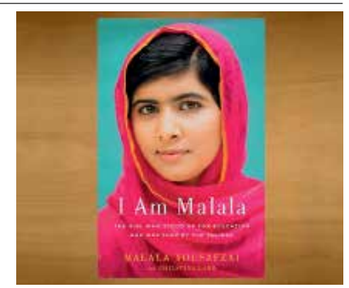


Saudi Arabia
Nura Alsaqer
I like books on self-development and biographies of successful people; they keep me motivated and increase my willpower. I'm reading Dr Ibrahim Elfaky. Next, it'll be Steve Jobs.

Aberdeen
Laura Hands
I'm currently refurbishing an old house. This might explain why I have developed an obsession with interior design magazines – to help me decide on the style of each room.

Mexico
Guillermo Perez
After the financial crisis of 2008, I decided to learn about investing; tutorials were a good start for me. Now I'm used to trading on the Mexican stock market and like to read about business and economic news.

India
Medha Kachroo
This is the extraordinary journey of the girl who was shot by the Taliban for fighting for her education rights. At seventeen, she is the youngest ever recipient of the Nobel Peace Prize.



In the next edition, we'd like to hear about your heroes: who inspires you, who do you look up to – whether it's a family member, friend or famous person. Please send a photograph of yourself, and a brief description and image of your hero to petrofacts.editorial@petrofac.com, to arrive in January 2015.

FINAL COUNTDOWN FOR THIS YEAR'S EVE AWARDS

More than 300 entries have been submitted for this year's EVE Awards, and it's now time for the finalists to be selected. The six lead judges explain to *Petrofacts* what they and their teams will be looking for in their categories

"This is a tough business; we demand a lot from the organisation and sometimes there is no time to reflect on the successes we have. Projects just move too quickly." So says Nigel Paton, one of this year's judges for the EVE Awards. The point he makes is echoed by his fellow five lead judges: that the awards programme is an opportunity for the entire Group to celebrate the 'drive to do things better'.

This year, more than 300 entries have been submitted – double the number from last year – and the six lead judges and their teams are busy working through them, along the six value-based categories: safe, innovative, responsive, ethical, quality and cost-conscious and driven-to-deliver. The finalists will be selected this month, and announced on 27 October.

Nigel Paton, who has worked at Petrofac for 11 years, is executive vice president for business performance in Onshore Engineering and Construction, where he focuses on operational excellence. He is the lead judge for the quality and cost-conscious category. "Reducing costs, but with no loss of quality or integrity is the key to future developments," says Nigel, explaining what he and his fellow judges are looking for. "We will be looking for ideas and solutions that combine added value to the customer, low technical risk, no loss of integrity in the plant and high availability in production."

Chris Allen, Group director of HSSEIA, who has been with the company for more than five years, is lead judge for the safe category. "When I first joined Petrofac," he says, "I was immediately impressed by the clarity with which we express and communicate our core values, which I believe are among our greatest strengths.

"As a judge, I'll be looking for people who are going beyond just doing their 'day job'. I'm always impressed by innovative ideas and smart solutions to old problems, but I hope that we will find lots of applicants demonstrating that they really are 'living' our values."

Last year's EVE Awards ceremony, addressed by Petrofac Group chief executive officer, Ayman Asfari

The EVE Awards started life in 2011 as part of the company's 30th anniversary celebrations and are run every year. Lead judge for the innovation category is Geoff Nesbit, who joined the company four years ago as Group head of technology strategy. "The EVE awards are an opportunity for the entire Group to celebrate our drive to do things better," he says. "In fact, I would be worried for any organisation that doesn't do this in some way and I am impressed with how the EVE awards have continued to develop and improve each year."

Geoff draws on a lifetime of 'structured play' to help explain what innovation means for him – from dismantling the toaster as a child to 'living in the laboratory' as a student. "Case studies suggest that there are many different reasons why we are driven to innovate, and successful innovators come from all walks of life. Equally, our businesses span a huge breadth of the oil and gas industry and there are strategic differences between evolutionary and incremental versus revolutionary and disruptive innovation. Ours can be a conservative industry, so we will be looking for innovation applicants to have prepared for challenging the status quo."

For Marcelo Cardoso, who has been the company's head of compliance since 2011, one of the most important elements in being successful in the EVE Awards is the idea of 'reach'. "We will be looking for initiatives that reach as many Petrofac colleagues as possible, as well as others outside the company as the case may be," he says. "We also want to see initiatives that can be replicated and demonstrate the business case for a company being ethical in all of its activities." He adds that the awards can also help create company-wide unity and understanding in a decentralised environment.

Peter Leach is senior vice president for IES in the Americas, and he has worked for Petrofac for almost eight years, this year heading up the judging for the driven-to-deliver category. "Alongside my fellow judges, we'll be looking for evidence of real passion for delivery over and above what is normal, or what is routine," says Peter. "It is important that we get a sense that this really is a shared value within the whole team."

Like the other judges, he believes that the awards themselves can generate real energy and enthusiasm. "They are a rare opportunity for Petrofac people to show what they have done and why they are proud of it," he explains.

Head of the responsive category is Chris McDonald. He has been with Petrofac for three years, and is executive vice president for ECOM's business development activities. Before joining the company, he already had more than 20 years' experience in the oil and gas industry, and he believes that it is responsiveness that creates success. "Being responsive is reacting in a way that is appropriate to the situation based on facts," he explains. "I believe that the key to an effective response is understanding the situation and being guided by logic rather than emotion."

In judging his category, Chris and his colleagues are looking for a 'can do' approach. "Someone, or indeed a team, who doesn't see problems, only solutions and is able to make things work – in whatever aspect of their work they are demonstrating value."

He adds: "These awards provide a formal environment for celebrated recognition for colleagues who have gone the extra mile. They serve to reinforce our strong heritage and most certainly add value to the brand."

Nigel Paton

'We will be looking for ideas and solutions that combine added value to the customer, low technical risk, no loss of integrity in the plant and high availability in production'

Nigel Paton, lead judge for quality and cost-conscious applications, is supported by E. S. Sathyanarayanan, Rabih Makarem and Ray Richardson

Marcelo Cardoso

'Importantly, these individuals needed to have a deep understanding of the importance of the compliance agenda and how the ethical value is embedded in the Petrofac culture'

Marcelo Cardoso is lead judge for the ethical category, joined by Rhibetnan Yaktal, Hugh Attwater and Glyn Jones

Chris McDonald

'I wanted to ensure that we have the broadest possible understanding of Petrofac's activities around the world; all of them have strong operations and business development backgrounds'

Chris McDonald is lead judge for the responsive category. Alongside him are fellow judges Paolo Bonucci, Jay Pearson and Rod McLeod

Geoff Nesbit

'We will look for improvements in performance or efficiency of practices that ultimately reduce cost or increase the value of what we do'

Geoff Nesbit is lead judge for innovation. He is joined by Graeme Jack, Rachel Hodges, Lorraine Fitzwater and Geoff Baker

Chris Allen

'Between us we have more than 100 years' experience from a cross section of companies and locations, so we should know what 'good' looks like'

Chris Allen is joined on the safe judging panel by Brent Pasula, Eric Henderson and Jim McQueenie

Peter Leach

'We'll be looking for evidence of real passion for delivery over and above what is normal or routine'

Peter Leach is the lead judge for the driven-to-deliver category. His team of fellow judges is Lakshmi Venkatesh, Walter Thain, Steve Major and Usman Darr

MY WORLD

GUILLAUME ROUX

Every issue, *Petrofacts* asks an employee to provide an insight into their world. This issue, meet Guillaume Roux, senior manager for Petrofac's Global IT Operations

You arrive at a party; how do you describe what you do to a stranger?
I'm the head of Global IT Operations for Petrofac – in a nutshell my team operates and maintains the systems that underpin our business.

Apart from your present location, where would you most like to work and why?
I have always been interested in seeing Australia, particularly around Brisbane where I think the lifestyle and weather would be close to what I grew up with in South Africa. I enjoy outdoor pursuits and would love my children to experience that kind of environment.

What was your first ever job?
I took my first job aged 15 delivering newspapers in my hometown Johannesburg. I used to start the day at 5am and the bag weighed a ton! The wages were minimal at the time but the lessons that job taught me about hard work have proved invaluable.

Which app or new technology has changed your life?
New devices and technologies arrive at an astonishing rate these days. For me the real breakthroughs have arisen from collaborative working technologies. The original idea of 'Groupware' can be traced back to the 1980s, but in reality the concept has only come of age recently. I see technology as an enabler for people, and collaborative working helps to build effective teams regardless of distance.

How would you answer the question: "Petrofac? What do they do?"
Petrofac innovate. Hundreds of firms provide oilfield services, but we are unique in what we do – just looking around you notice Petrofac people are different; we encourage innovation, thinking outside of the box and taking pride in everything we deliver.

Mac or PC?
A controversial question indeed! My family and friends know I am a PC man. Apple is a fruit...

Where do you get your best ideas?
I think the best ideas come from brainstorming with colleagues; it goes back to collaboration – two heads are better than one!

What do you most admire in a person?
I respect honesty and hard work, someone who is prepared to go the extra mile and go beyond what is expected of them.

What's your idea of happiness?
For me happiness is about balance. I need to feel challenged in my professional life, while having quality time to spend with my family. I live to work, but also work to live.

What's your idea of misery?
Being starving hungry and all that was left to eat in the world was beetroot!

'I think the best ideas come from brainstorming with colleagues'

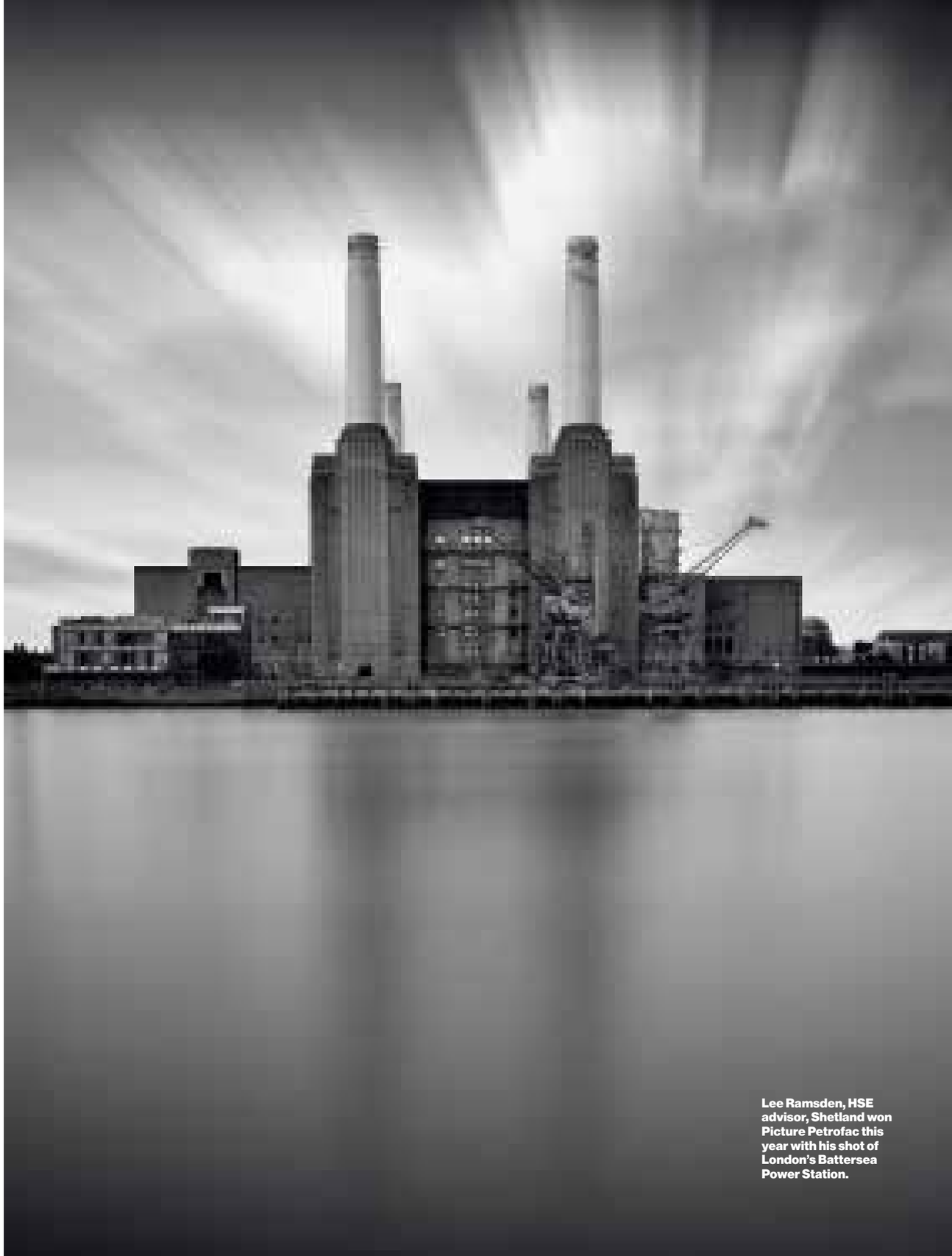
Which entertaining Twitter feed would you recommend?
I am an advocate of social media, but I don't use Twitter. I think it's important not to let your life online encroach too much into your personal time. I've drawn the line at Facebook, which I love using to share photos with my friends and family back in South Africa.

What did you want to be 'when you grew up'?
I have always dreamed of being a game farmer; growing up I spent much of my time in the African bush. I would love to own my own game ranch in retirement; hopefully my dream may still become a reality.

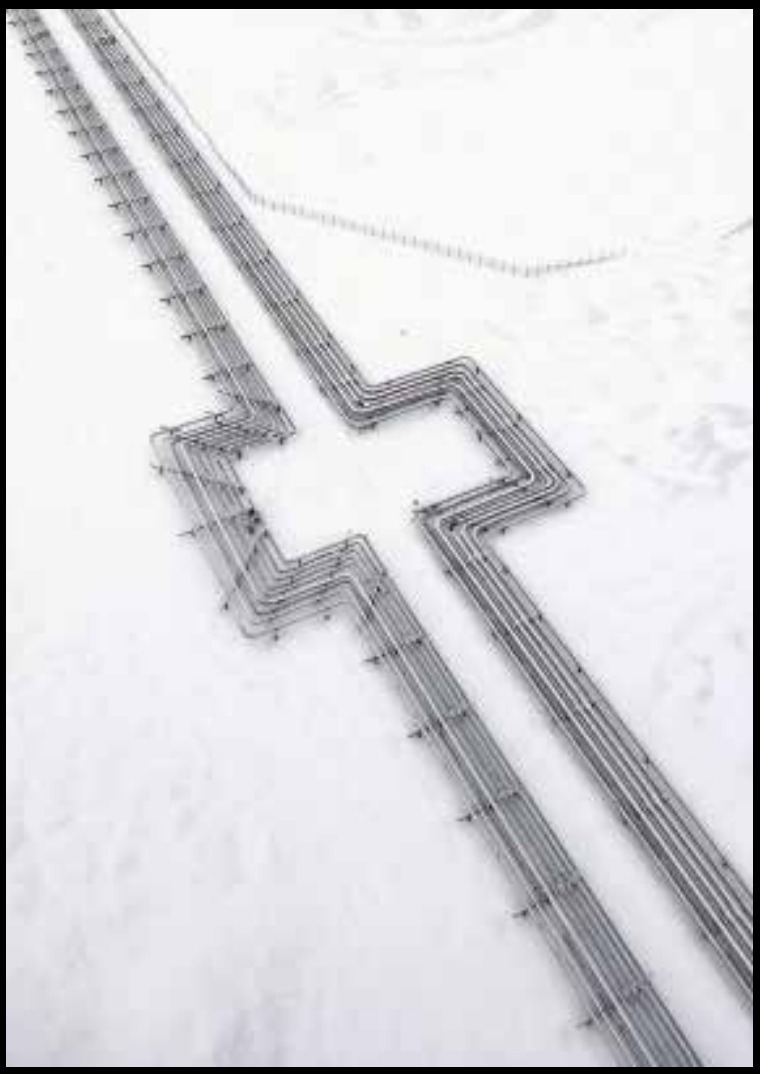
What do your colleagues not know about you?
Before I moved to the UK I achieved my black belt in Korean Combat martial arts, and took classes in Capoeira, a Brazilian martial art.

Where was the last place you went on holiday?
We went down to Cornwall for a few relaxing days on the beach in July. The weather was fantastic – we've been blessed with a great summer in the UK this year.

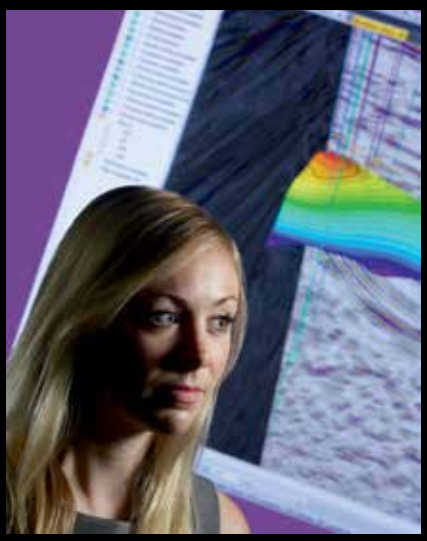
Tell us a joke
There was once a young man who professed his desire to become a great writer. When asked to define 'great', he said, "I want to write stuff that the whole world will read, stuff that people will react to on a truly emotional level, stuff that will make them scream, cry, howl in pain and anger!"
He now works for Microsoft, writing error messages.



Lee Ramsden, HSE advisor, Shetland won Picture Petrofac this year with his shot of London's Battersea Power Station.



Splendid isolation
'Alaska is a very different place to work'



The depths of imagination
'Subsurface is exciting because it is the challenge of the unknown'

The future in their hands
'These people are the pioneers for the next stage of the company '