



ADVANCED MANUFACTURING, MATERIALS & ENGINEERING

CASE STUDIES



Case Studies

From the MATRIX 2016 AMME Report

In 2016 MATRIX undertook an ambitious review of the Advanced Materials, Manufacturing and Materials (AMME) sectors in Northern Ireland.

As part of the research, we asked Business Eye editor Richard Buckley to conduct interviews with the leaders of some of the most innovative companies in the sector.

Photography: Michael Cooper



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A portrait of Rob Hardeman, a middle-aged man with short grey hair, wearing a dark grey blazer over a light blue and white striped shirt. He is standing in front of a window with vertical wooden frames, looking directly at the camera with a slight smile.

*Rob Hardeman, Chair of
the AMME Study*

Introduction

As Chair of the Matrix Advanced Manufacturing, Materials & Engineering (AMME) study, I've spent the last year talking to companies across Northern Ireland, trying to find out more about the challenges that they face and the opportunities they foresee.

What is clear from the work undertaken during the past six months is that manufacturing still lies at the very heart of business and industry in NI. The region's strong manufacturing heritage is in good shape, with a higher percentage concentration of manufacturing businesses in NI than in the UK as a whole. What is not always fully appreciated, however is the breadth and depth of AMME activity in NI and its global impact.

The NI AMME sector is diverse, with activities ranging from aerospace, automotive, electronics, pharmaceuticals, and chemicals to heavy plant, automotive, agri-tech equipment and construction products. These case studies illustrate the strength and vibrancy of the wider AMME sector.

I'd like to thank everyone who participated in these interviews (and indeed, everyone who has contributed to the AMME study). Particular thanks should also go to Richard Buckley for carrying out the interviews and Michael Cooper for the photography.

Rob Hardeman

Vice Chair of MATRIX, the Northern Ireland Science Industry Panel and Chair of the AMME Study



*John Blackstock,
banah UK*

banah UK....A Concrete Study in R&D

banah UK is a company where a winning formula of patent rich innovation and high tech solutions followed by investment in plant and QC/ testing and understanding has enabled the company to begin production and realise their first sales, all in a relatively tight R&D life cycle.

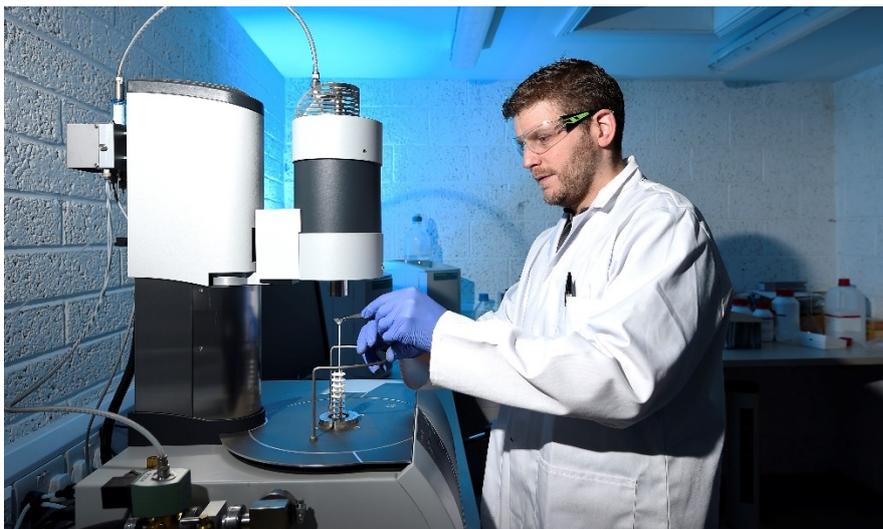
Right next to banah's name on its signage is the strap line 'Cement Reimagined' and it's a little phrase that sums up the company rather well.

Banah, its founder John Blackstock, his two sons and the rest of the small team at its base near Coleraine are doing something that no other company in the world is doing right now. They're pioneering and producing a revolutionary new type of cement.

And it's hard to underestimate the role that cement plays worldwide. Did you realise that concrete is the second most used commodity in the world.... after water? That equates to half a tonne for every man, woman and child on the planet.

But those statistics relate to the mass market for cement. The team's new product, banahCEM, is a unique new low-carbon cement based on a geopolymer binder system. It comes in two components – a powder and liquid – and it has a number of important advantages over traditional Portland cement.

It's much more environmentally friendly, it's resistant to much higher temperatures and it's also resistant to many more harmful chemicals. It's not hard, then, to see how Banah's new cement might find applications in worldwide markets.... despite the fact that, for now at least, it is considerably more expensive than traditional cement.



“One of the big drawbacks of traditional cement is that it is high in CO². In short, it's really not good for the planet. That was my starting point, but a lot of reading, a lot of thinking and a lot of research has gone into it since then.”

Back in 2013, banah UK received further investment from Tobermore Concrete Products, an individual investor and Invest NI backing for its R&D base and manufacturing plant at Macosquin, where cement production swung into operation for the first time in April of this year (2016).

But the company's story goes back a lot further than that. A quantity surveyor by profession, Antrim man John Blackstock has always had innovation and invention in his blood. He worked in England for a number of years, returning home to work on new product lines with the Larne-based Kilwaughter Chemicals, retiring from there at the age of 54 several years ago.

Except, of course, he didn't retire. "I had been working with cement for quite a while. It's a great product but it has its limitations and I was convinced that the future lay in geopolymers," he says. "One of the big drawbacks of traditional cement is that it is high in CO². In short, it's really not good for the planet. That was my starting point, but a lot of reading, a lot of thinking and a lot of research has gone into it since then."

John Blackstock linked up at the early stages with a scientist with an established interest in cement technology. McIntosh started working for the fledgling company in a Portakabin close to Blackstock's Antrim home....and banahCEM was born.

The science behind the concept is as complex as anyone would want it to be. In essence, the production of Portland cement involves the burning of limestone and sources of silica (clay) at very high temperatures.

"But it is this very process that produces high levels of CO²," says John Blackstock. "We started by looking at nature for our lessons. Limestone doesn't react well to fire while rocks like basalt and granite are the opposite. Our research took us deeper into the chemistry of rocks and minerals."

The in-depth research of Blackstock and McIntosh brought the pair into contact with Professor Joseph Davidovits, a French materials scientist credited with the invention of the term geopolymer chemistry. Davidovits had a deep interest in what the Banah team was trying to achieve and, in turn, his expertise and experience were very useful to the Northern Ireland company.

"He challenged us at every step, he introduced us to work on geopolymers going on at university level, and he encouraged us to push boundaries.

"The potential is huge. Our main challenge? That has to be price.

"Our product may perform better but it's multiple times the price of traditional cement... and no one really wants to pay more."



“In some ways, we went back to basics. Calcined china clay was too expensive, so we looked at what was available and that brought us to clays formed as a result of the weathering of basalt. We started to look closely at these clays - how we could heat treat them, driving off the chemically bound water.”

Banah developed its business case, and its processes, from that intensive blue sky R&D. John Blackstock's two sons, Kenny & Andrew hold positions within the growing team and the board is chaired by David Henderson, Chief Executive of local firm Tobermore Concrete Products, a high profile believer (and investor) in Banah and its ideas for the future of cement.

Currently a number of academics work closely with the Banah team. These include Professor John Provis, Professor of Cement Materials Science & Engineering at the University of Sheffield, alongside Professor Marios Soutsos and Dr Sreejith Nanukuttan of the School of Planning, Architecture and Civil Engineering, Queens University Belfast. The company has collaborated with both QUB and Sheffield to facilitate a KTP research associate.

“The science and the manufacturing process is one thing,” says John Blackstock. “But we do have our challenges. Because of the global scale of the industry, cement is cheap. Something like four billion tonnes of it are produced each year. However, it is all the same kind of cement.”

“So we're aiming for sales in what you might call the alternative cement marketplace worldwide. The potential is huge. Our main challenge? That has to be price. Our product may perform better but it's multiple times the price of traditional cement....and no one really wants to pay more.”

On a global level, cement production plants tend to be huge facilities. Cement giants Lafarge recently spent a cool £500 million to build a new plant in Nigeria. Banah has effectively built a 10th scale, bespoke, state of the art cement production facility at Macosquin, capable of producing 150,000 tonnes per year.

It may be smaller than the industry norm, but this is still a substantial manufacturing plant by any local measure. It represents a large-scale upfront investment by the Banah shareholders, and its running costs are not to be sniffed at. That's despite the fact that it heat treats its product at less than half the temperature used in the production of Portland cement.



AS A PRODUCT, BANAHCEM IS DIFFERENT IN A NUMBER OF KEY WAYS:

- IT CAN OFFER AN 80% REDUCTION IN CO² CONTENT
- ITS FIRE RESISTANCE IS MUCH HIGHER THAN THAT OF PORTLAND CEMENT
- IT IS RESISTANT TO MANY CHEMICALS
- IT GAINS STRENGTH MUCH QUICKER THAN TRADITIONAL CEMENTS (A KEY ADVANTAGE IN SOME CONSTRUCTION SCENARIOS SUCH AS TUNNELS)

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John Blackstock smiles when he recounts how he was told that the plant's natural gas usage was on a similar scale to that of the whole nearby town of Portstewart.

“We designed the whole plant effectively from scratch and we've used the very best available technology,” says Blackstock, who bought the industrial site at Macosquin back in 2013.

Banah's sales effort will be international but is currently focused on the GB marketplace, where the company already has a small sales team in place. “The feedback from the customers we've spoken to so far has been really positive. A lot of people in the business are watching what we're doing here very closely indeed.

“This is not a traditional cement plant. We've designed the plant and our processes to be flexible. It can run efficiently for a short period of time, can heat and cool quickly and accommodate subtle chemistry changes.

“So we've done the blue sky thinking and a huge amount of customer-focused R&D has taken place, and we will continue to listen to what our potential customers are saying. It's important that we remain quick on our feet.”



*Gavin Campbell,
Bombardier*

Bombardier...Advancing the Cause of Manufacturing

Gavin Campbell is quick to brush away any interviewer concerns about the complexity of his subject matter.

“It’s true. People can be very wary of R&D and subjects like advanced manufacturing and materials,” he says. “But, at the end of the day, it’s about making products that are attractive and products that work. It’s business.

“Advanced manufacturing is also all about cost. The costs faced by businesses in Northern Ireland are a challenge.... high energy costs, European labour costs and, in our case here at Bombardier, we’re sending our finished products 3,000 miles to our biggest customer, our parent company in North America.”

In common with others in technology and manufacturing here, Campbell is conscious of Northern Ireland’s industrial heritage. It would be difficult for him to avoid it, working at a plant that has built some iconic aircraft and next door to the Harland & Wolff shipyard site.

“I think it does count for a lot,” he says. “We’re used to having industry around us in Belfast, we’re naturally creative and the people here are well suited for manufacturing jobs. Other companies here have shown that, and relatively new ventures like the NI Science Park are great examples of the creativity and innovation that we have around here.

“Whether it’s software or shipbuilding, I think we’ve shown through the years that we have the ingenuity here in Northern Ireland. Look at the entrepreneurs we’ve had and still have – William Wright up in Ballymena, Tom Eakin, FG Wilson to name just a few.” Gavin Campbell is talking at NIACE, (the Northern Ireland Advanced Composites and Engineering Centre) the impressive new 3,700 sq.ft facility next door to Bombardier’s main entrance on Airport Road.

Officially opened in January 2012, it’s an industry-led university-hosted centre for research and development around advanced engineering and advanced materials technology, particularly in the area of composites. It’s home to 120 research and development staff at any one time.



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“Both Queen’s and Ulster Universities are involved here and we’re working alongside a growing range of different companies based in Northern Ireland, from the big industrial names like Bombardier, Wrightbus, Denroy Plastics and BE Aerospace through to smaller companies such as CCP Gransden and Datum Design.

“This centre is a very tangible outworking of what Matrix, the NI Science & Industry Panel, has set out to do. It’s all about promoting technology, driving technology and increasing investment in technology. “And, while it might seem obvious to say it, technology really does need a lot of research and development. It needs workshops, it needs facilities, it needs people to test and to build...and it can all be a little bit speculative sometimes. But that’s the nature of the beast, and that’s where entrepreneurial spirit and drive comes in.”

“The aero sector has the stated ambition of growing revenues to NI to £2 billion within the next ten years, and aims to increase high value employment to 12,000 in the same period. It’s a formidable target.”



Gavin Campbell will be playing his part in the forthcoming Matrix study into advanced materials and manufacturing in Northern Ireland, following on seven years after the last study of its kind.

“A lot can happen in seven years and a lot has happened in the past seven years,” he says. “The aero sector has the stated ambition of growing revenues to NI to £2 billion within the next ten years, and aims to increase high value employment to 12,000 in the same period. It’s a formidable target.”

He has been with Short Brothers Plc and Bombardier Aerospace for 30 years since graduating in mechanical engineering from the University of Ulster. Outside of his role at the plant, he’s a visiting Professor in the Faculty of Computing & Engineering at Ulster University and a Fellow of the Institution of Mechanical Engineers. He’s played an important role in the development and current manufacture in Belfast of the highly advanced composite wings for Bombardier’s new generation C Series aircraft.

“Talking of timescale, the aircraft have been a long time in development but they’ll still be flying in 25 to 30 years’ time, and the design will be around for 50-60 years.

For those in other industries here in Northern Ireland, things are very different. A piece of software or an app can be obsolete in a matter of months. In some ways, that’s one of the challenges facing organisations like Matrix and the NI Science Park.

“In our industry, it can be better to take longer on R&D. The C Series is a very good example of that. As a result, we’re beating the brochure. Both the CS100 and CS300 are turning out to be more fuel efficient, quieter and with a better range than we’d promised in the sales literature....and that’s according to our customers.

“The C Series aircraft wing isn’t just manufactured in a highly advanced assembly plant in Belfast. It was also researched and developed here.

“So it is a really good example of how advanced materials and composites are being used by industry here in Northern Ireland. Another shining example is the new generation London bus which was designed and developed by Wrightbus in Ballymena.”

Gavin Campbell, like many of his counterparts in engineering and manufacturing, stresses the importance of working hard to encourage young people to consider careers at the sharp end of engineering.

“It goes further back than our universities and FE colleges right into our schools. That’s where we need to be encouraging pupils to look at careers in industry here. It’s vital that we have the right people coming through.

“What we also need to see is a continued flow of spin-out companies coming out of our universities and colleges. I think we underestimate how many jobs are being created from these companies being set up. We really can’t encourage it enough.....”

The recently published NISP Connect report on the Knowledge Economy here showed that Northern Ireland has maintained its position as the 2nd fastest growing KE region in the UK.

A total of 410 start-ups were created in KE in the past year, KE salaries are 50% higher than other sectors on average, 85% of products and services are exported and it’s currently estimated that 10% of the NI economy is driven by KE.

“So it couldn’t be much more important,” says Campbell. “It shows that we’re still entrepreneurs and we’re still creating.

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“It’s not traditional manufacturing of the kind that Shorts did 25 years ago and Harland & Wolff did a hundred years ago, but it’s technology for today. And that’s crucial. It is the way that we are going to re-industrialise Northern Ireland.”

On the more traditional manufacturing front, Gavin Campbell singles out the impressive cluster of quarrying and materials handling equipment manufacturers in County Tyrone for special mention.....the ‘sons and daughters of Powerscreen’ as one commentator described the cluster recently.

“It’s very impressive what they’ve achieved in Tyrone and we’re talking about companies which might have their roots in shaping metals and welding but which have moved on to embrace advanced manufacturing techniques.

“Advanced manufacturing is more than simply the sum total of the labour and the parts that go into it. It’s a lot more than that... it adds value, it drives prices up and it impacts on the bottom line for the company concerned.”

Matrix, he says, has an important role to play in driving forward the advanced manufacturing agenda in Northern Ireland, in shaping DfE policy and the next Programme for Government and its contents.

“We need to look at skills and the flow of people into industry going forward, and we also need to focus on where we stand internationally and at how our departments and agencies can all work together to the best effect.

“We have creativity, we have an entrepreneurial spirit and what is being achieved in the knowledge economy shows that we’re on the right track.”



*Sean McNicholl,
Sphere Global*

Automation for Industry....Sphere's World Vision

Whenever there is widespread change in any sector, it's a safe bet that a word or phrase will be coined to describe it. So, on that note, the new buzzword for the increasing automation of industry is Industry 4.0.

Think about what the Industrial Revolution did for the Victorians and you start to get a picture of the type of wholesale change that is already taking hold in the industrial sector worldwide.

Sean McNicholl doesn't need to be told about Industry 4.0, its challenges and its opportunities. He has achieved more in six short years than a lot of entrepreneurs can hope to achieve in a lifetime of doing business.

The Co. Derry software and automation specialist returned home from working overseas and set up Cornerstone Automation Systems (later re-branded to become Sphere) six years ago, and the industry automations specialist firm is already working with customers like Amazon and competing with Siemens and other giants of the industry.

As a software engineer starting out over in America, he recalls being sent by his company to the control room of the Hoover Dam. “I remember thinking that maybe I should call my mum and ask her to buy me a ticket back home. I was horribly out of my depth,” he says.

But the Hoover Dam experience didn't dent young Sean's enthusiasm. He went on to travel around the world in various roles, building up plenty of experience along the way.

And he's still clocking up the miles today. In the past year, he reckons that he's logged close to 130 flights to talk to Sphere customers in the likes of Dubai, India and Australia.

Sphere's business is the business of automation. In short, the company helps its customer companies to coordinate the flow of materials and supplies through large manufacturing operations, warehouses and distribution centres. The company's bespoke solutions – and they're all bespoke solutions – are designed to minimise costs and to maximise efficiencies and accuracies through the process.



“Our aim is always to come up with a solution that works for the customer, a solution that ultimately increases profitability. At the end of the day, that's what it's all about,” says Sean McNicholl.

What is remarkable about the company, based at Campsie, is that it does everything in house.

“We start by talking to the customer, finding out what they need and then we come up with the concept design,” explains McNicholl. “But we also do all the fabrication, the software development, the building, the testing, the installation on site and the after sales service and maintenance.”

“I want Sphere to be a big international brand. I want this company to be the company big businesses turn to for their automation needs. We're active now in 16 countries worldwide, and just about every sector we're working with is growing,”



Sean McNicholl reckons that his industry is the second fastest-growing sector in the world (second to healthcare), and perhaps that's not surprising given the growth in large-scale distribution warehouse operations all over the globe.

“So we looked at global targets right from the start. There was never any question of us starting with local markets and then developing from there. This is a sector that's expanding rapidly, so our targets have to be ambitious and they have to be on a global scale.”

It's an approach that seems to be working. Sphere has doubled or trebled its turnover every year since it started out in business.

The company operates across a number of industry sectors, and healthcare remains a core business. A couple of years ago, Sphere's R&D team at Campsie came up a new drug dispensing system capable of dispensing up to 100 million prescriptions a year. It's this kind of technology that is putting a relatively small company in Northern Ireland on the global map and helped it to win the 'GROWTH THROUGH EXPORT AWARD 2016' at the North West Business Awards Ceremony in May 2016.

Sean McNicholl's decision to re-brand the company from Cornerstone to Sphere also had a clear vision in mind. "I want Sphere to be a big international brand," he says simply. "I want this company to be the company big businesses turn to for their automation needs."

The firm has a number of sales agents working on its behalf around the world, but a lot of the sales effort still falls on the shoulders of the company founder and CEO. "We're active now in 16 countries worldwide, and just about every sector we're working with is growing," he says.

As a hands-on CEO, he's built up an impressive list of contacts, from the CEO's of some of India's bigger corporations to senior people in Apple and members of the Dubai ruling family.

The customer list too is impressive and includes names like Dell, Amazon and Next. "There are few big organisations now who don't have some element of automation in their business," McNicholl adds. "And those levels of automation are increasing all the time."

Three or four years ago, there were an estimated 3,500 SKU (Stock Keeping Unit) management systems in operation worldwide. Now these systems, used by Amazon amongst others, number well over 50,000.....and growing.

"Our customers come to us with a problem. That's how this business works. It's down to us to provide a cost effective solution to those problems, whatever it is that they produce or distribute. Our technology is out there working with medicine, food, tyres and tablets at the moment.

"We have customer sites where robots are working alongside people, and we have others where we've taken automation to the leading edge of technology.

"Working globally means working on some large-scale projects. We are involved in one site in Bangalore in India which extends to 2 million square feet and has 45 robots as part of its automation system."

At any given time, there is going to be a number of Sphere teams overseas working on customer site installations.....in Saudi Arabia, the Philippines, Dubai, Germany or elsewhere.

Sphere also provides 24/7 remote cover. "We can talk to any piece of our technology anywhere in the world using our phones or laptops, and we can often solve problems wherever they are within minutes."



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But there are also local examples of how Sphere can make a difference for its customers. At Lynas Food Service in Coleraine, Sphere redesigned and automated a chilled foods packing line and significantly increased the number of lorry loads processed per hour.

Founded with just four employees just as recession kicked in back in 2010, the company now has a team of 80 engineers and other staff and anywhere up to 50 sub-contractors at any given time. Sean McNicholl has his concerns over future staffing levels....and being able to find the right people to maintain Sphere's rapid growth.

“One of the biggest problems we face is the fact that this is a relatively new sector, and the skills aren't taught at colleges or universities to any great degree. But we've started to engage with the universities and we're hoping to have more and more students coming on board with the training they need to work in a leading edge industry.

“But we're also prepared to train on the job. In a business like this, there's no substitute for working in the real world with our customers.”

Sphere is also in the early stages of planning a 100,000 sq.ft extension to its Campsie plant, a move which would mean the recruitment of some 70-80 new staff.

“At 200,000 sq.ft we would become the largest automation plant in the UK as a whole, and we'll need that kind of capacity to handle orders that we already have on our books going forward. We have a very firm aim to be the market leaders in this sector and to become a £100 million turnover company.

“And we think that it's achievable through repeat business, through innovation in new product lines and through research and development. The technology, in this business, is always developing. Just In Time principles are king. Our customers, and the solutions that they have in place, are driving this company forward.

“We're providing the heartbeat in each of our customers' operations, and that's something that we're very proud of.”



*Rob McConnell,
CCP Grandsen*

Rich History...Ambitious Plans for Co. Down Manufacturer

There aren't too many companies around the manufacturing sector in Northern Ireland that can trace their history back to the late 1800's.

Nestled in the County Down countryside on the outskirts of Ballygowan, CCP Grandsen is one of them. Established way back in 1896 as A.W. Hamilton Engineering on Belfast's bustling dockside, the firm repaired ships and acted as a contractor to the nearby Harland & Wolff shipyard. Remarkably, it has stayed in family ownership since then.

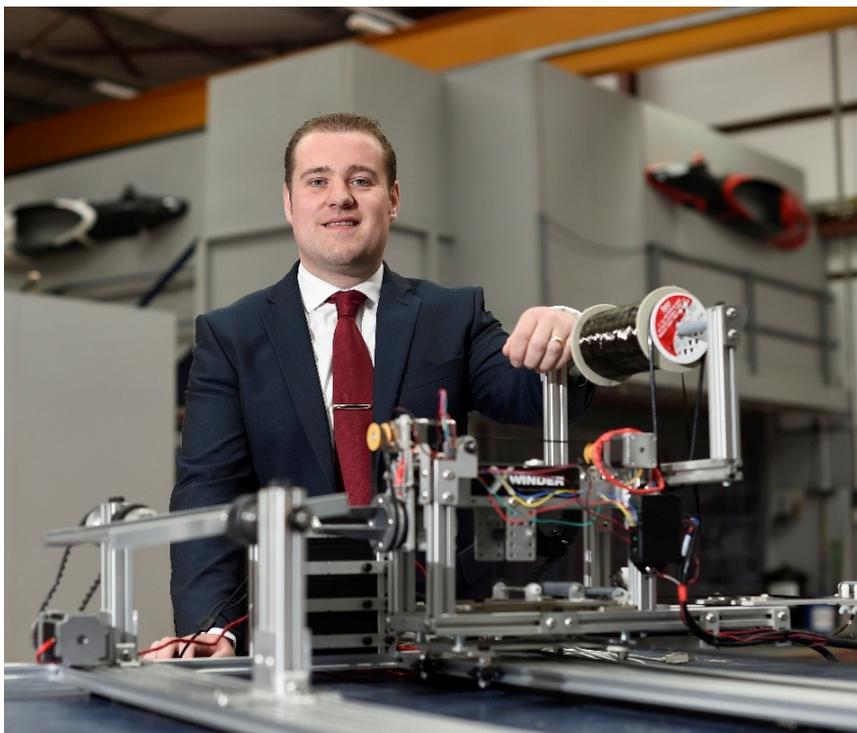
Current MD and Owner Jim Erskine's mother was a direct descendant of the original founder Augustus Hamilton.

“We rank as one of Ulster Bank's oldest customers,” says Director Robert McConnell. “But the company has certainly not stood still in that time.”

That said, cutting edge engineering (of a different variety) and innovation are still at the core of today's business. “The company evolved through time and responded and adapted to market changes. So, as heavy engineering waned, the company got involved in new technologies. In fact we were one of the first local engineering firms to see the potential of composite materials in its very early stages. It was back in the 1950's and 60's that the firm started to move from shot blasting and metal coating towards corrosion resistant plastics and those pioneering composites. Customers back then included some of Northern Ireland's leading blue chips, Michelin, Enkalon and Courtaulds amongst them.

As the corrosion resistant plastics element of the business grew, the company name evolved with it. Corrosion control plastics led to the CCP acronym, with Gransden added when the firm acquired Gransden (Bi-Chem) and the Allied Colloids water treatment chemical business.

Today, CCP Gransden business has two distinct areas of business, one of which is in the chemical field. Working now as the main local agent for chemical giants BASF, the Ballygowan firm is the market leader in the supply of flocculants used in the treatment of water, waste water and minerals.



“We're not keen to be pigeon-holed as a company that is limited to one specific area of manufacturing or another.

“Our future, we think, is as a highly flexible manufacturer working with a wide range of customers and our aim is to build on our reputation as an innovative products of high quality finished products.”

Robert McConnell joined the company in 2012, and is helping to steer those engineering and composite skills in another direction, into an innovative new future as a key composites manufacturer with customers in the aerospace, defence, marine and energy sectors.

“We work with a variety of advanced materials including carbon, glass, aramid and natural fibres,” he says. “We can also select the best composite mix for specific applications using polyester, epoxies and phenolic and natural resins.”

“The company evolved through time and adapted to the changes happening around it.

“So, as heavy engineering waned, the company got involved in new technologies, and it was one of the first local organisations to see the potential of composites in their very early days.”



CCP Gransden is one of the most active members of the Northern Ireland Advanced Composites & Engineering Centre (NIACE), the industry-led technology hub based next door to Bombardier's Belfast plant. Robert McConnell chairs one of the key committees at the Centre.

“We're very committed to research and development, to innovation and to collaboration with others in our industry sectors,” adds Robert.

Today, the Ballygowan-based company has a number of key areas of core business, ranging from general composites manufacturing to the manufacture of composites for the construction industry and filament winding.

“We're not keen to be pigeon-holed as a company that is limited to one specific area of manufacturing or another. Our future, we think, is as a highly flexible manufacturer working with a wide range of customers and our aim is to build on our reputation as an innovative producer of high quality finished products.”

CCP Gransden has invested over £1 million on automation equipment in recent years, and Robert believes that investment in both equipment and R&D will continue as the company strives to win more contracts in the exacting aerospace and defence sectors.

“R&D plays a vital role,” he adds. “But it's important to stress that R&D has to lead to workable solutions that can be implemented, resulting in real business improvements, something that's crucial to our competitiveness in the wider marketplace.”

The company might be one of the Ulster Bank's oldest business customers, but the bank hasn't made much from it in loan repayments. “We've never been into borrowing...we've tried to grow organically over the years.”

But sales don't come without a spot of hard work. Robert McConnell and his colleagues travel widely to present CCP Gransden's expertise to some of the biggest industrial names around. In the aerospace industry alone, relationships have been built with the likes of Airbus, Brazilian plane makers Embraer and NI-based BE Aerospace and, in recent months, CCP has made inroads with Jaguar Land Rover, one of the biggest UK operators in the automotive sector.

Like others in the advanced composites field, the company struggles to find experienced people. “It's almost impossible,” Robert says simply. “So our solution has been to train and develop our existing staff. This thankfully has not been a struggle, and staff retention levels are excellent. So our staff have the perfect blend of several years of combined experience, with up to date training using the latest techniques, machinery and materials.”

The company is future proofing the skills shortage however, and has established links with both South Eastern Regional College – its local FE establishment – and Belfast Met, collaborating on engineering course requirements and providing training and placements to students. It's also an established client company of Invest NI.

“We're prepared to work on our own or collaborate with partners,” he says. “We're great believers in the old maxim that a rising tide lifts all ships. It's not sensible to fear competition in a sector like this one.

“We don't set out to be the cheapest in the marketplace. That would be impossible. What we aim for is the right balance of quality and value.

“Manufacturing in Northern Ireland is alive and kicking, and we are as good an example of that as any.”



*Jonathan Holmes,
Creative Composites*

Creative Composites....At Technology's Cutting Edge

Creative Composites is one of those companies that goes into the 'hidden gem' bracket when it comes to advanced manufacturing in Northern Ireland.....a company not on many people's radar but one at the very forefront of its industry.

Based at Knockmore outside Lisburn, Creative Composites – as its marketing tag line puts it – is the UK's most advanced composites manufacturers.

It makes finished composites products for use in high performance cars, in buses, in medical technology, in aerospace, in materials handling and in the rather more everyday world of vending machines. And that's to mention just a few of its end product applications.

The company can trace its roots back 40 years or so when it was the composites division of the highly successful Boxmore International group. After Boxmore International was sold to US firm Chesapeake, an MBO took the Composites Division out on its own. Then based at a 25,000 sq. ft facility at Blaris Industrial Estate, the firm moved to a purpose built composites manufacturing plant at Knockmore in 2005, doubling its production space at a stroke. Since then, it's been doubled again to 100,000 sq.ft.

“So we've quadrupled our square footage since the MBO back in 2000,” says Creative Composites Managing Director Jonathan Holmes. “It has been a case of steady growth in terms of production and sales over the past number of years.

“High quality components are at the heart of what we do here,” he explains. “Our mission statement is clear cut. We set out to achieve better design, better manufacture and better service than our competitors. And we have to achieve that within the kind of short lead times that our customers demand.”

“We have the flexibility to cater for composites projects with high, medium or low volume demand, and that has meant a substantial investment through the years in equipment.’

The Creative Composites plant at Knockmore includes state of the art presses, active levelling, in-mould coating and vacuum technology. Robotics are used for certain high precision processes.



“Our mission statement is clear cut. “We set out to achieve better design, better manufacture and better service than our competitors. And we have to achieve that within the kind of short lead times that our customers demand.”

“We've recently added a fourth compression moulding press generating 1500 tonnes of moulding pressure and capable of processing units of up to three metres by two metres in size. It ranks as the most advanced technology available in this industry.”

Creative Composites has an established reputation at the high quality end of the composites marketplace. Components manufactured at Knockmore are standard fit, for example, on some of the very best British-made supercars.

“Believe me, if there is even a tiny blemish on the finish of the piece, our customers would reject it without any hesitation. So we have to get it right every time. The car industry, especially at supercar level, is all about weight reduction. So we also have to continually rise to the technical challenges that are set for us.”



The firm has made everything from the full body shell of the ultra lightweight Lotus Exige sports car through to a series of body components for other big brand name car makers.

Each one, not surprisingly, has to be machined to the very highest standards. “Believe me, if there is even a tiny blemish on the finish of the piece, our customers would reject it without any hesitation. So we have to get it right every time,” adds Jonathan Holmes.

“The car industry, especially at supercar level, is all about weight reduction. So we also have to continually rise to the technical challenges that are set for us.”

The automotive industry customers aren't the only ones requiring high quality and precision. Creative Components also manufactures large-scale components for MRI scanners assembled in Germany.

Closer to home, the company does have customers within Northern Ireland – notably Wrightbus & Hyster Yale Materials Handling, makers of fork lift trucks in Craigavon.

“Like any other business, this one is all about the important relationships that we have with our customers. The service element is just as key to us as design and manufacturing are.

“We take a strategic view of R&D,” adds Jonathan Holmes. “We actively carry out product development here. The expertise in this industry, as well as most of the customers, lies outside of Northern Ireland. But we stay very close to our markets. That’s the approach that works for us as a company.

“We look at different materials, we test materials, and we concentrate on the design and development of the end products that our customers want.”

Jonathan Holmes says that Creative Composites has been through a sustained period of growth and intends to continue that growth.

“We will grow the business alongside our customers and with a clearly defined range of products,” he says. “Looking to the future, we also see sales going up, square footage going up and a continued investment in technology. That’s essential to keep pace with the demands of our customer base.”

But the firm is also looking at new sectors and new customers. One current example is the railway sector. Train manufacturers and operators, like those in other transport sectors, are focused on lightweight materials and weight reduction.

“Customers, whatever sector they are in, expect strength, quality and functionality. And that’s before we get into cosmetic requirements. Depending on where the final product is used, the surface finish can be just as important as anything else.

“We may not qualify as low-cost in the global marketplace, but it is important for us to be cost competitive and add value to our customers’ products.” he adds.

Skills are an issue for Creative Composites, in common with other companies in the advanced manufacturing sector.

“It is difficult to get the right people,” says Jonathan Holmes. “We’ve got some great design people here and some great engineers, but we’ve had to train them on site over the years. Our customers simply expect a level of expertise from us. Maintaining that will always be a focus for us.”



“Like any other business, this one is all about the important relationships that we have with our customers. The service element is just as key to us as design and manufacturing are. We take a strategic view of R&D; we actively carry out product development here. The expertise in this industry, as well as most of the customers, lies outside of Northern Ireland. But we stay very close to our markets. That's the approach that works for us as a company. We look at different materials, we test materials, and we concentrate on the design and development of the end products that our customers want.”

The company has worked alongside the Polymer Processing Research Centre (PPRC) at Queen's University in Belfast, but does relatively few formal links with education or academia. Instead, it takes a very pragmatic approach to training and developing its people on the Knockmore site.

“Our design teams have a workload that will see them going flat out for the next two years,” Holmes adds. “We've got facilities in place for significant growth on our own Knockmore site. After that, we are looking ahead for further expansion.”

“Whatever direction we do go in, we'll be aiming to be the best at what we do and at the top of our sector.”



*Darryl McShane,
Greiner Packaging*

Greiner Packaging.....It's All About The People

When Dungannon company Greiner Packaging started to find it difficult to get the right people to work in its high-technology plastic packaging plant, it decided to take matters into its own hands.

The company, part of an international group with 35 manufacturing sites across Europe and the Americas, has designed and implemented its very own Greiner Gold Programme.....an advanced form of high level apprenticeship combining comprehensive in-house training with day release classroom sessions organised by local FE colleges.

A full four-year programme, it leads to a third level qualification and, crucially, means that participants are paid as full-time Greiner employees throughout the period.

“What we're offering isn't just normal jobs,” says Darryl McShane, Greiner's Senior Operations Manager. “This is a professional programme which leads to a recognised qualification but it's also an opportunity to come into engineering and manufacturing and make a real contribution right from the start.”

The first batch of five 'graduates' to come through the programme are already working in a variety of roles at the Dungannon plant, and others are in the process of coming through the system.

“It is a two-way process,” adds Pauline Hillen, HR Manager at the company. “Our participants get out of it what they put in. If they work hard and study hard, the rewards are definitely there for them. And every one of them enjoys the team ethos that we have here at Greiner.”



“People are our biggest assets. They always have been, but we became aware several years ago that we were having problems recruiting people with the skills that we needed.

“We had a few options, I suppose, but our answer was to tackle the problem ourselves.....to bring in talent and provide the training ourselves, with help from the further education sector.”

Still a family-owned company with its corporate headquarters in Austria, Greiner Packaging bought the locally-owned Wilsanco Plastics operation back in 2006 and established its Northern Ireland plant. The site manufactures a broad range of rigid plastic packaging for the food and non-food industries, turning out upwards of a billion pots every year for yoghurt, desserts and other products. It also manufactures various bespoke bottles to contain everything from soft drinks to grass seed.

Processes include thermoforming, extrusion, injection moulding, injection stretch blow moulding, extrusion blow moulding and IML technology.....the inclusion of a plastic label within the manufacturing process, most commonly using injection moulding, and resulting in an instant finished end product.

Greiner Packaging employs a team of just less than 220 staff in Dungannon (9,000 globally), and the Northern Ireland operation turns over £34.5 million, making it a sizeable business by most measures. Some 85% of its markets are dotted around GB with a further 10% in the Republic of Ireland. The past 10 years since the Wilsanco acquisition has seen a 138% increase in sales, 30% employment growth and a £27 million investment.

“We've grown through the years. We've added new technology and new process.

“So we started to look in detail at how we could train people ourselves. It was a lengthy process, but one that's been well worthwhile”



The company has achieved a strong reputation, and won awards, in two key areas. One is its commitment to staff training. The other is an impressive commitment to environmental measures. At Greiner's Dungannon plant, it's certainly not a case of paying lip service to environmental credentials.

Not only is the on-site warehouse heated by waste heat generated by the production process, but an Integrated College next door to the site is also fully heated all year round from the same source.....an innovative move directly inspired by Greiner's Northern Ireland Chief Executive Jarek Zasadzinski. It's also a move that saves the school authorities an estimated £100,000 a year in heating oil bills.

And, on the other side of the equation, an innovative 'Project Cool' initiative reduced costs by 40% and led to the plant being cooled entirely by wind (....plentiful around the hills of Tyrone) rather than expensive air conditioning units, making full use of its hilltop site on the outskirts of the town. It's an idea 'borrowed' from a Greiner sister plant in Switzerland.

The Dungannon plant is also proud of its position as the second most energy efficient plant in the European Greiner group (it was No. 1 until recently), and the company has received assistance over recent years from both Invest Northern Ireland and the Carbon Trust.

Greiner believes in continual investment and, over the past couple of years, has embarked on an overhaul of facilities and infrastructure at the site.

But it's the company's approach to training and the establishment of the unique Greiner Gold Programme that is likely to make a lasting impact on its commitment to leading edge manufacturing.

The first entrants started out on their programme back in 2011 with five 'graduates' completing their training in June of last year. A further six are on the course at the moment and six more are due to start this summer.

“People are our biggest assets,” says Pauline Hillen. “They always have been, but we became aware several years ago that we were having problems recruiting people with the skills that we needed. We had a few options, I suppose, but our answer was to tackle the problem ourselves.....to bring in talent and provide the training ourselves, with help from the further education sector.”

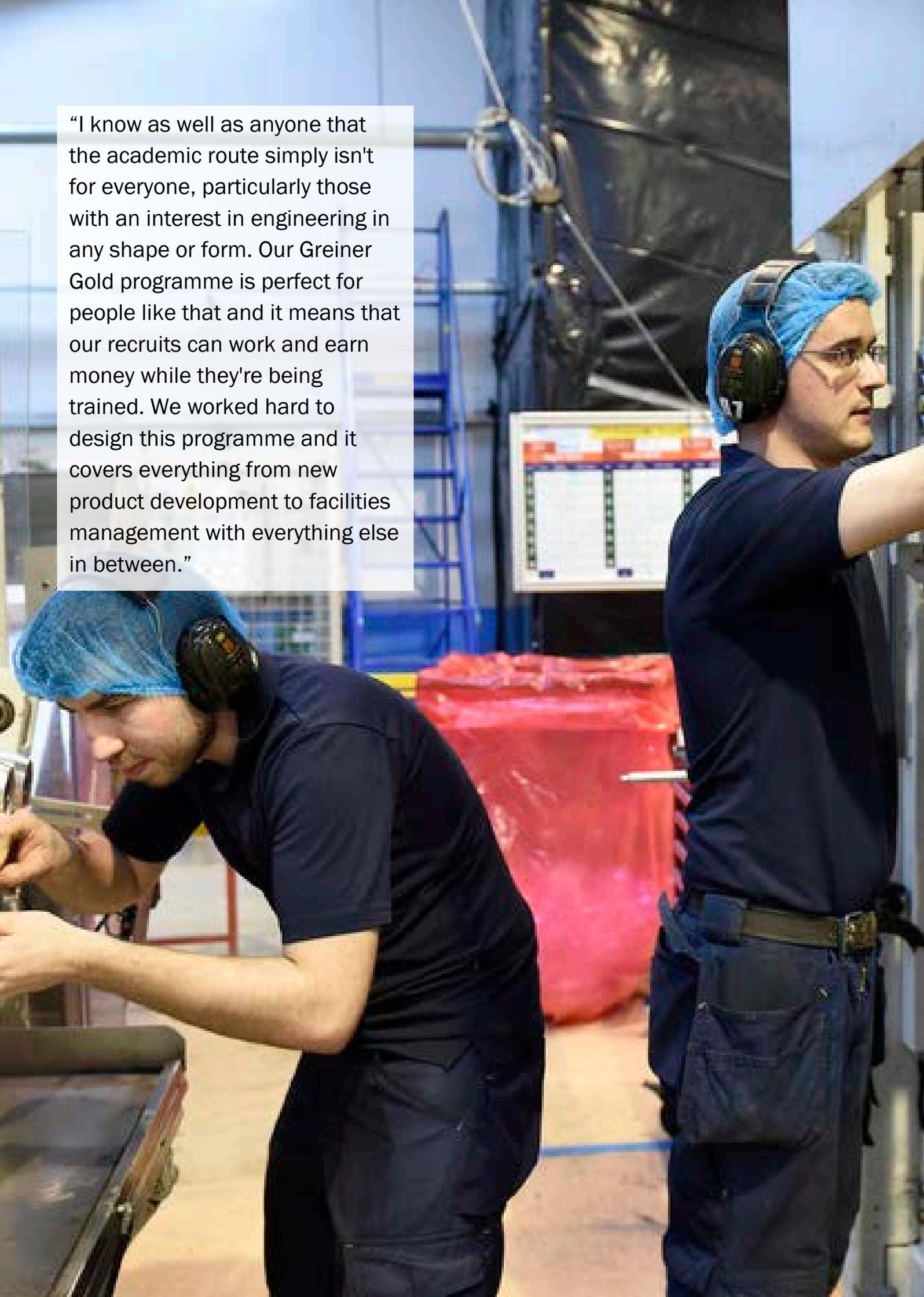
“We've grown through the years. We've added new technology and new process,” adds Darryl McShane. “So we started to look in detail at how we could train people ourselves. It was a lengthy process, but one that's been well worthwhile”

Darryl McShane himself left school at 17 and completed an ONC and HNC qualification at technical college while serving a traditional apprenticeship with Beverage Plastics in his home town of Lurgan. He went on to complete a degree in mechanical engineering at Queen's University in Belfast before returning to the Lurgan company as a Design Engineer. He joined Greiner Packaging as Engineering Manager, later becoming Senior Operations Manager.

“So I know as well as anyone that the academic route simply isn't for everyone, particularly those with an interest in engineering in any shape or form,” he adds. “Our Greiner Gold programme is perfect for people like that and it means that our recruits can work and earn money while they're being trained.

“We worked hard to design this programme and it covers everything from new product development to facilities management with everything else in between.

“I know as well as anyone that the academic route simply isn't for everyone, particularly those with an interest in engineering in any shape or form. Our Greiner Gold programme is perfect for people like that and it means that our recruits can work and earn money while they're being trained. We worked hard to design this programme and it covers everything from new product development to facilities management with everything else in between.”



“But what it also delivers is significant benefits for our company as a whole. Our more experienced operators and managers act as mentors for the young people on the programme. It's fair to say that some of them were a bit wary at first.....but now they love doing it, and we can see how the mentors gain benefits as well as the trainees.”

“Good recruitment is key,” says Pauline Hillen, whose department is responsible for recruiting all employees and leads the promotional and recruitment aspects of the programme, as part of the overall steering group.

“We look for six GCSE's at Grade C or above or two A Levels, but more importantly, we're looking for young people with an interest in technology and in what they can learn from us, and young people who can show some evidence of leadership.

“The Greiner Gold Programme has been a major investment for us as a company but there's no doubt that it has helped to bring the Greiner name to the fore here in the mid-Ulster area, where there are a lot of big manufacturing companies in need of good people.”



*Kieran Hegarty,
Terex*

Kieran Hegarty, Materials Handling & The Tyrone Factor

A lot has been said and written about the growth and existence of a remarkable cluster of materials handling companies in deepest County Tyrone. But, like a lot of his industry counterparts, Kieran Hegarty reckons there is a pragmatic explanation.

Yes, there's an engineering tradition around here," he says from his office at Terex Corporation's plant on the outskirts of Omagh. "But I think it's largely explained by the original 'inventors' of mobile screening machinery, Finlay & Powerscreen, starting up in the 1960's. Then, over the years, people left those companies and started out on their own. A wider group of suppliers grew up around the main players," he says simply.

Whatever the root causes, the materials handling cluster around Dungannon & Omagh is impressive by anyone's standards. It accounts for a substantial slice of the world's supply of top-quality materials handling plant....especially for the quarrying industry.

But, while other sectors within the reach of Matrix, the Northern Ireland Science Industry Panel, might have teamed up to look at common challenges, the materials handling sector remains a little more fragmented.....and that's a challenge and something that Matrix, and its sectoral group chairman Dr. Rob Hardeman of Seagate in Derry, will be keen to highlight. It's not just about the fragmentation that exists, but looking forward, about the real value that can be gained from working together.

"One of the factors that sets us apart is that the main companies here in Tyrone are competing with each other for business around the world," says Kieran Hegarty. "We tend to meet each other at airports when we're on our way to talk to customers in Europe, America or anywhere else."

Hegarty spends up to three weeks every month outside of Northern Ireland, hardly surprising given the fact that Terex sells 98% of its output externally and that it is owned by a multi-faceted industrial corporation with its headquarters in Westport, Connecticut.



"We've taken the long-term decision to concentrate our efforts on mobile machinery rather than look at static units, as some have done. It's a clear policy decision to produce mobile machinery for the production of minerals around the world....and we think that it's the right decision for us."

The Terex NI President is a graduate of both Queen's University and the University of Ulster and started his working life in the USA before returning home to join Finlay Hydrascreens in 1992. Both Finlay and its Tyrone neighbours Powerscreen were acquired by Terex in 1999.

Hegarty runs the group's Materials Processing division, one of five key divisions within Terex. The others are divisions responsible for cranes, aerial work platforms, port/plant solutions and general construction equipment. Within Materials Processing, Terex runs three manufacturing plants in Northern Ireland – at Omagh, Dungannon and Ballymoney.

“We're only too happy to work with the universities but it's important that they become more proactive in the way that they engage with industries like our own.

“The aim has to be to increase the quantity of talent coming through education to industry. The quality is there, but the numbers are not. It's as simple as that.”



The company has some 1,400 employees working across the three sites. The division also has plants in the US, Germany, Austria and Malaysia.

The Tyrone-based Materials Handling sector might have achieved a strong reputation but it's not without its challenges, according to Kieran Hegarty.

“Those are the macro issues, but there are micro issues around our own industry to think about too. We've taken the long-term decision to concentrate our efforts on mobile machinery rather than look at static units, as some have done. It's a clear policy decision to produce mobile machinery for the production of minerals around the world....and we think that it's the right decision for us.”

A sizeable supply base has been built around the big materials handling players in County Tyrone, with small companies supplying everything from metal fabrications through to belting systems.

A middle-aged man with short, graying hair is shown from the chest up. He is wearing a dark blue suit jacket over a light blue and white vertically striped button-down shirt. He has a serious expression and is looking slightly to the right of the camera. His hands are clasped together on a surface in front of him. A semi-transparent white text box is overlaid on the right side of the image, containing two paragraphs of text.

“We do face low-cost competition but at Terex we’ve taken it on head-first, by setting up a big plant in India to produce machinery with local specifications to suit the local marketplace.

“As for the Chinese, I think high transport costs make it well nigh impossible for the Chinese to export heavy machinery internationally. However, China itself offers huge potential for our type of product in the longer term.”

The big ticket engines and advanced hydraulics still tend to come into Tyrone from big global-scale suppliers.

“We’ve seen the growth of a strong industrial sector based around materials handling and that’s a good thing,” he says.

Another key challenge for Terex (and others) is to try to establish a steady supply of good, young qualified engineers. “There is definitely a very limited pool of talent here in Northern Ireland and we think that it’s a problem that needs to be addressed.

“We’re only too happy to work with the universities but it’s important that they become more proactive in the way that they engage with industries like our own,” adds Hegarty. “The aim has to be to increase the quantity of talent coming through education to industry. The quality is there, but the numbers are not. It’s as simple as that.”

Sales professionals, he goes on to add, are also thin on the ground.....especially those capable not just of understanding the intricacies of mobile stone-crushing machinery but also able to jump on an aircraft at a moment’s notice and sell the equipment to a plant operator in the middle of Africa. The machinery built at the Terex plant in Omagh and Dungannon is shipped to the UK, to Western Europe, to North America, to Australia and to India, amongst other destinations. Traditionally these are machines powered by diesel engines but increasingly there is a trend towards hybrid diesel/electric power units..... although that’s less important in sub-continental marketplaces.

“We do face low-cost competition but at Terex we’ve taken it on head-first, by setting up a big plant in India to produce machinery with local specifications to suit the local marketplace.” As for the Chinese, the Terex chief reckons that high transport costs make it well nigh impossible for the Chinese to export heavy machinery internationally. “However, China itself offers huge potential for our type of product in the longer term.”

He’s hoping that a new report by Matrix, the NI Science Industry Panel, into the Advanced Manufacturing and Materials Handling sector will encourage more Government support for industry here.

“I think that some form of increased support for R&D would be very welcome. For a business like our’s, R&D is everything. We’ve got to innovate and keep on innovating to win sales internationally.

“We also see huge potential in some new areas,” he says. “A good example is the environmental recycling of construction waste – brick, metals and wood – which we reckon can be a major growth area as more and more legislation is introduced to encourage recycling worldwide.

“But, for us, that’s one for the future. We’ve enough to keep us busy just at the moment.



*Jim Sergeant,
Whale Pumps*

Whale....3D Technology Brings New Direction

Bangor-based Whale has been a leading manufacturer of pumps for the marine and caravan industries for many years, but the US-owned company is branching out in an entirely new direction.

Whilst many of us will have watched the rapid rise of 3D printing technology with a passing interest, Whale was one of a small band of innovative companies ready to invest in the industrial potential of the technology,

It bought its first 3D printer five years ago, established a business case and went on to purchase a couple of the very latest 3D print units in more recent years, setting up a dedicated Whale 3D division based in one of two buildings Whale occupies on the outskirts of Bangor.

“Why did we get into 3D print technology? Because we could see it was a way for us to produce prototypes for seals, diaphragms, casings and other components for the R&D side of our own business,” says Whale’s Technical Services Manager, Jim Sergeant. “Before this technology was available, a prototype might take two or three weeks through design and production. On a 3D printer, we can produce what we need in 24 hours.

“That’s a major advantage when it comes to speeding up the whole development process, and it can also reduce tooling costs.”

From a starting point of printing component prototypes in house, Whale 3D soon found that there was a substantial demand out in the wider marketplace. “Some of our customers in the marine and caravan industries started to ask us about producing components and it all spiralled from there,” adds Jim. “Nowadays, we have well over 100 different customers in the aerospace, automotive, toy and even jewellery sectors in the UK, North America, China and Australia.

Whale 3D also works closely with Stratasys, the US-based world leader in the production of large-scale 3D printing machines, and has partnered with Stratasys at exhibitions and shows to showcase the application of the technology within industry.

“Before this technology was available, a prototype might take two or three weeks through design and production.

“On a 3D printer, we can produce what we need in 24 hours.”





“3D printing technology is still in its relative infancy, and it has a long way to go.

“So what is vital for us is that we move forward with the technology itself.

“There are plenty of people out there who firmly believe that it will replace a lot of manufacturing operations as we know them in years to come.”

In a corner of Whale 3D's Technology & Polymer Centre are a collection of models – a human hand, a fully-armed soldier, and a complex working set of gears – produced on the company's printers and used to demonstrate 3D print capabilities at shows and events. As yet, this isn't a competitive industry at least here in Northern Ireland. Only one other local company is reckoned to have the 3D printing capability of Whale.

Whale's Engineering Director Richard Bovill talks about a change of mindset at the company five or six years ago when 3D print technology was very definitely in its infancy. “We saw it as a way of producing small prototypes and of testing products before tooling up for production in our main plant,” he says. “But we couldn't have foreseen how it would develop once we got started down this road.”

The Northern Ireland firm has an interesting history dating back to the early 1800s and its origins as Munster Simms in the fuel distribution business. Munster Simms branched into engineering and started producing bilge pumps for the Royal Navy during the Second World War, transferring that expertise post-war to the leisure boat marketplace.

Most recently, it has produced a range of pumps for use in boats, caravans and recreational vehicles. The company was the subject of an MBO back in 2008, led by former Managing Director Patrick Hurst, and went on to be acquired by the Brunswick Corporation two years ago.

Headquartered in Illinois, Brunswick owns some of the world's leading leisure boat and boat engine brands. Whale forms part of the division which also includes Mercury, the outboard engine manufacturers.



“New product innovation is the key to our business. We've got a team of 40 engineers here in Bangor. We even have our own software development unit. So we're well placed to come up with new product applications to keep our 12 injection moulding machines in our main plant busy. Largely, we'll recruit and train our own people, and we haven't had any problems doing that as yet. Our only difficulty, to be honest, is that there just aren't enough hours in the day.”

But Richard Bovill stresses that the Northern Ireland operation is given a largely free rein by its American parent company. Now based at twin purpose-built sites in Bangor, Whale is now a £19.4 million turnover operation with a staff of 170, almost all of whom are based in Northern Ireland.

“We're very proud of the fact that we do everything – design, R&D, manufacture, sales and administration – here in Bangor,” says Richard Bovill. “And we're sending our products out from here to 52 countries worldwide.”

The firm's core customers are still in the leisure marine (38%) and caravan/RV (32%) sectors, but it also produces pumps and accessories for the healthcare and drainage sectors. Within those sectors, Whale produces a larger than expected number of different products.

In the marine sphere, for example, Whale's trademark bilge pumps are joined by marine plumbing systems, fresh water pumps, toilet pumps and water heaters. Gas water heaters are added to the range for the caravan sector, and Whale has tapped into a new market producing pumps to help power domestic showers.

“New product innovation is the key to our business,” says Richard Bovill. “We've got a team of 40 engineers here in Bangor. We even have our own software development unit. So we're well placed to come up with new product applications to keep our 12 injection moulding machines in our main plant busy.”

The firm's Engineering Director says that any skills shortage isn't an issue for the company. “Largely, we'll recruit and train our own people, and we haven't had any problems doing that as yet. Our only difficulty, to be honest, is that there just aren't enough hours in the day.”

Whale estimates an annual research and development spend of £1.5 million annually and that's unlikely to change.

The Bangor operation also lays a strong emphasis on product quality. “It's what we are all about and it is absolutely central to what we do here,” says Bovill. “We aren't the cheapest manufacturer in our marketplace, but we think that we are the highest quality manufacturer around. Continuous improvement is part of the culture here.”

Certainly, there are plenty of boat owners around who'll testify to the reliability – season after season – of Whale pumps, whether they're bringing fresh water up to their sinks, pumping dirty seawater out of the bilges, or flushing the heads (as toilets are called on board).

It's a testament to the firm's attention to detail that a former employee still runs a small business providing spares for the original brass bilge pumps made by the company based in the 1940s and 50s.



*Tim, Vaughan & Chris Monroe,
Smiley Monroe*

Smiley Monroe...Giants Of Belting

Smiley Monroe's 'Giants of Belting' catchline is a clear hint that this is a company which puts marketing right up there with research, development and innovation when it comes to priorities.

In fact, the Lisburn company's professional approach to corporate identity and customer image can be seen on its signage, its vehicles....even the branded shirts and other garments its employees wear.

“We might be in a specialist niche sector, but we realise that the image we portray to our customers and potential customers is very important,” says Marketing Director, Tim Monroe, one of a three-strong father and two sons team at the helm of the family-owned firm.

Based over two sites in Lisburn's Knockmore Industrial Estate, Smiley Monroe ranks as one of the world's leading specialist manufacturers of 'endless' conveyor belts for customers in the mobile crushing, screening, washing and recycling marketplaces.

Formed back in 1979 in one of the Monroe family's garden sheds not far from its present site, it has grown in scale to employ 125 people in Lisburn and a further ten at a satellite manufacturing facility near the Indian city of Bangalore.

The company was featured in the London Stock Exchange's 2014 report '1000 Companies To Inspire Britain', a celebration of the fastest-growing and most dynamic SME's in the UK. The list highlighted the UK SME's that have not only performed strongly since 2009 – an exceptionally challenging period – but have also outperformed their sector peers.



“The fact that we can offer competitive prices to our customers is partly due to the fact that we've adopted lean manufacturing principles and that we have a skilled and experienced supply chain team.

“In fact, when our US customers benchmark us against local suppliers of conveyor belts, we're still competitive....even though we have to ship across the Atlantic Ocean. “

“You can't really change much about the chemical process of vulcanization.

“But we can add value to our end products, we can manage our work flow, we can train our team in lean tools and best practices and we can involve everyone in our improvement programmes.”



It's all a far cry from the early days when Vaughan Monroe and Mark Smiley started up a two-man business acting as distributors for rubber conveyor belts and belt parts.

“Dad was the salesman, my mother handled the bookkeeping and Mark fitted conveyor belts for the local stone quarries who were our customers back in those days,” Tim Monroe explains.

After a brief spell in a rented 'lock-up', the partners took the plunge and purchased their first premises, former stables in Lisburn, and that's where Smiley Monroe remained until relocating to its current £1.2 million Invest NI-backed Knockmore facility in 2002. More recently, the company has added a major production and distribution hub around the corner from the main production plant, where belting is stored in preparation for delivery to customers.

Today, some 80% of Smiley Monroe's revenues come from the manufacture of belting products for OEM's – original equipment manufacturers of screening and quarrying equipment. A lot of those customers are in Northern Ireland where County Tyrone has a highly successful cluster of quarrying equipment manufacturers accounting for a remarkably high proportion, 40%, of the worldwide marketplace.

That 2002 move into the purpose-built Knockmore plant was Smiley Monroe's biggest leap of faith. It took the company from being a distributor of conveyor belts to a manufacturer of conveyor belts. It also led to Vaughan Moore being joined in the business by two of his sons. Tim had been working as an art director in the film industry in Glasgow while Chris was practicing as a solicitor in England.



“Our core competence is in splicing. It's a skilled craft and a very precise process used to join conveyor belts using a combination of heat and pressure. Then we customise these 'endless' belts with other features as required by our customers and the equipment they will be using them on. For instance, we might add moulded rubber cleats or side rails to the belt's surface.”

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That means names like Terex, McCluskey International, Sandvik, Telestack and CDE Global.

Beyond Tyrone and Northern Ireland, Smiley Monroe exports to European and North American OEM brands such as Keestock, Metso, Kleeman (part of the German Wirtgen Group) and Astec Industries.

“Our core competence is in splicing. It's a skilled craft and a very precise process used to join conveyor belts using a combination of heat and pressure. Then we customise these 'endless' belts with other features as required by our customers and the equipment they will be using them on,” he adds. “For instance, we might add moulded rubber cleats or side rails to the belt's surface.”

In addition to producing belts and rubber parts for its customers in the crushing, screening and recycling sectors, Smiley Monroe also supplies the environmental and road construction sectors. Any sector, in fact, where belts are required for mobile machinery.

Between direct exporting and the export of equipment on which its belts are fitted, Smiley Monroe can claim that 95% of production from the Lisburn plant goes overseas and that its products are in regular use in 42 different countries.

In 2012, and partly in response to the importance of the Indian sub-continent to one of its biggest customers, Terex, Smiley Monroe established its own Indian manufacturing operations.

“Setting up in India for the first time isn't without its challenges,” says Tim Monroe. “But we know that there are huge opportunities for us out there and we're currently building up the team that we have on the ground.”

“We're intent on staying at the top of our game in a very competitive marketplace... retaining our existing customers and gaining new ones at the same time.”



In terms of OEM's in the quarrying industry, Smiley Monroe's biggest customer is the American-owned Terex Group. End user customers include Ireland's CRH Group and the UK's Aggregate Industries and Hanson Aggregates.

But the company's oldest customer is Irish Salt Mines in Carrickfergus. It's a business relationship that dates back to those early days in the Lisburn shed back in 1979.

Research, development and innovation are all important to the company's continued development. Smiley Monroe has a current Knowledge Transfer Partnership with Belfast Metropolitan College which has resulted in the placement of a specialist researcher into the Lisburn operation.

The company also has a close association with the Polymer Processing Research Centre at Queen's University and with the Northern Ireland Polymers Association, headed up by Dr. Gerry McNally.

"It's an industry driven by innovation but the basics have remained the same. You can't really change much about the chemical process of vulcanisation – the curing of rubber at 150 degrees and at 100 PS of pressure to produce greater strength, elasticity and durability," says Tim.

"But we can add value to our end products, we can manage our work flow, we can train our team in lean tools and best practices and we can involve everyone in our improvement programmes.

"The fact that we can offer competitive prices to our customers is partly due to the fact that we've adopted lean manufacturing principles and that we have a skilled and experienced supply chain team. In fact, when our US customers benchmark us against local suppliers of conveyor belts, we're still competitive....even though we have to ship across the Atlantic Ocean.

"And we're problem solvers for our customers. We help them to find solutions based on years of field experience in conveying and screening applications in quarries, mines and cement plants."

The company also boasts a rigorous testing facility to test both incoming raw materials and finished products. It's ten years since the company was first awarded ISO 9001 and OHSAS 18001 quality and health and safety management accreditations.

Its next goal is to achieve ISO 14001 environmental accreditation and plans are also in place to recruit the company's first professional rubber technologist.

"We're intent on staying at the top of our game in a very competitive marketplace.....retaining our existing customers and gaining new ones at the same time."



*Brendan Lafferty,
Seagate*

Seagate's High Technology Challenge

Even the basic facts and figures around Seagate Technology's Springtown plant rarely fail to impress.

A world leading facility in every way and the biggest of its kind anywhere, the plant employs some 1,400 people, runs 24/7 and ships some two million read/write transducers every day.

That said, you won't see any articulated trucks emerging from the Springtown site. Two million transducers will fit neatly into a large jiffy bag.

The Seagate plant's challenge, in fact, is all about size and scale. In short, as demand grows for data storage space, Seagate's researchers and engineers are charged with playing their part in making recording technology smaller.....then smaller again.

Research & Development Director Brendan Lafferty takes up the story.

“We're already working in atomic sizes, hundreds of thousandths of a human hair,” he says simply. “And we're making a lot of progress. We're averaging a 15 - 20% growth in aerial density, which is the quantity of information bits than can be stored on any computer storage medium.

“But, at the same time, global demand has been growing by 30 to 40%. The past two years has seen another acceleration in demand, and we're expecting a tenfold increase by 2020. So you can start to see the challenge we face.”

Seagate Technology (with around 40% of the global market) is one of three remaining large-scale manufacturers of hard disk drives in the world – the others are Western Digital (a further 40%) and Toshiba (20%). Hard disk drives store data in a series of small magnets in the surface coating of the disk. The maximum aerial density is defined by the size of the magnetic particles in the surface, as well as the size of the head used to read and write the data.

That's where Seagate's Springtown facility comes in. It celebrated its 20th anniversary back in 2013 and it's one of a network of worldwide plants run by the US-based parent company, an employer of some 55,000 people worldwide.



“We're already working in atomic sizes, hundreds of thousandths of a human hair, and we're making a lot of progress. We're averaging a 15 - 20% growth in aerial density, which is the quantity of information bits than can be stored on any computer storage medium.”

“It is very technologically challenging to work here; we're talking about engineering on an atomic scale. But it's that high level of technology that actually attracts a lot of really bright people to come and join us.

“We do our best to recruit and develop as much indigenous talent as we possibly can, but we've also got a very strong international team working here. “



“Crack open any hard drive from any computer and the odds are pretty good that there'll be a component in there that was manufactured here at Springtown,” adds Brendan Lafferty. “This site is the largest producer of read/write transducers in the world. In fact, there are only five, including our Seagate sister plant over in Minnesota.

“In effect, our task is to shrink the magnets and increase capacity at the same time. We have to try to close the gap between the increases that we can achieve and the increase in global demand for memory. That's what it comes down to.”

The Springtown plant has two primary cost factors – its advanced engineering equipment and its people. Of that 1400-strong workforce, a significant proportion are highly educated technical and scientific people. There are more than 100 PhDs on site, and the company continues to recruit highly qualified people almost as quick as it can get them.

It works with a number of leading UK universities, among them Southampton University which has a world-leading optoelectronics department.

“It is very technologically challenging to work here; we're talking about engineering on an atomic scale. But it's that high level of technology that actually attracts a lot of really bright people to come and join us.”

The company has strong and established links with the Department of Enterprise Trade & Investment (soon to be the Department of the Economy), Invest NI and Queen's University.

“We do our best to recruit and develop as much indigenous talent as we possibly can, but we've also got a very strong international team working here,” says Brendan Lafferty. “We've got Italians, Germans, French, Spanish, Lebanese and a large contingent from a number of Asian countries.”

On the equipment front, Seagate's technology comes from suppliers in Europe but, to a large degree, from Japan. It's not unusual to see Japanese engineers around the Springtown facility.

“This plant is fairly unique by its nature, at least in this part of Europe,” says Brendan Lafferty. “The only industry whose technology is comparable is the semi-conductor sector, and a plant like Intel in Leixlip near Dublin.”

Springtown might turn out two million read/write transducers every day, but it's no quick process. From start to finish, the manufacturing process has some 1200 individual steps and spans four months. It takes a further four months for the finished hard disk drive product to leave Seagate's downstream production plants elsewhere in the world.

“Quality is vital,” says Lafferty. “It's an intricate science and an intricate process. So, if one small element goes wrong, it can have a very serious effect.”

The output from Springtown goes to internal customers within the wider Seagate group, in particular to two plants in the USA (in Colorado & Minnesota) and two in Asia (Korea & Singapore). Seagate Springtown personnel travel regularly in both directions to ensure seamless working within the wider hard disk drive manufacturing operation.



“The thing about this industry is that there is no stationary state. If we don't keep going forward in terms of what we're achieving, we'll start going backwards. “And that's really not an option in an industry like this one.”

“We're pretty well placed as far as time zones go,” Lafferty smiles. “We find that we're working with Asia in the mornings and the US in the afternoons and evenings.

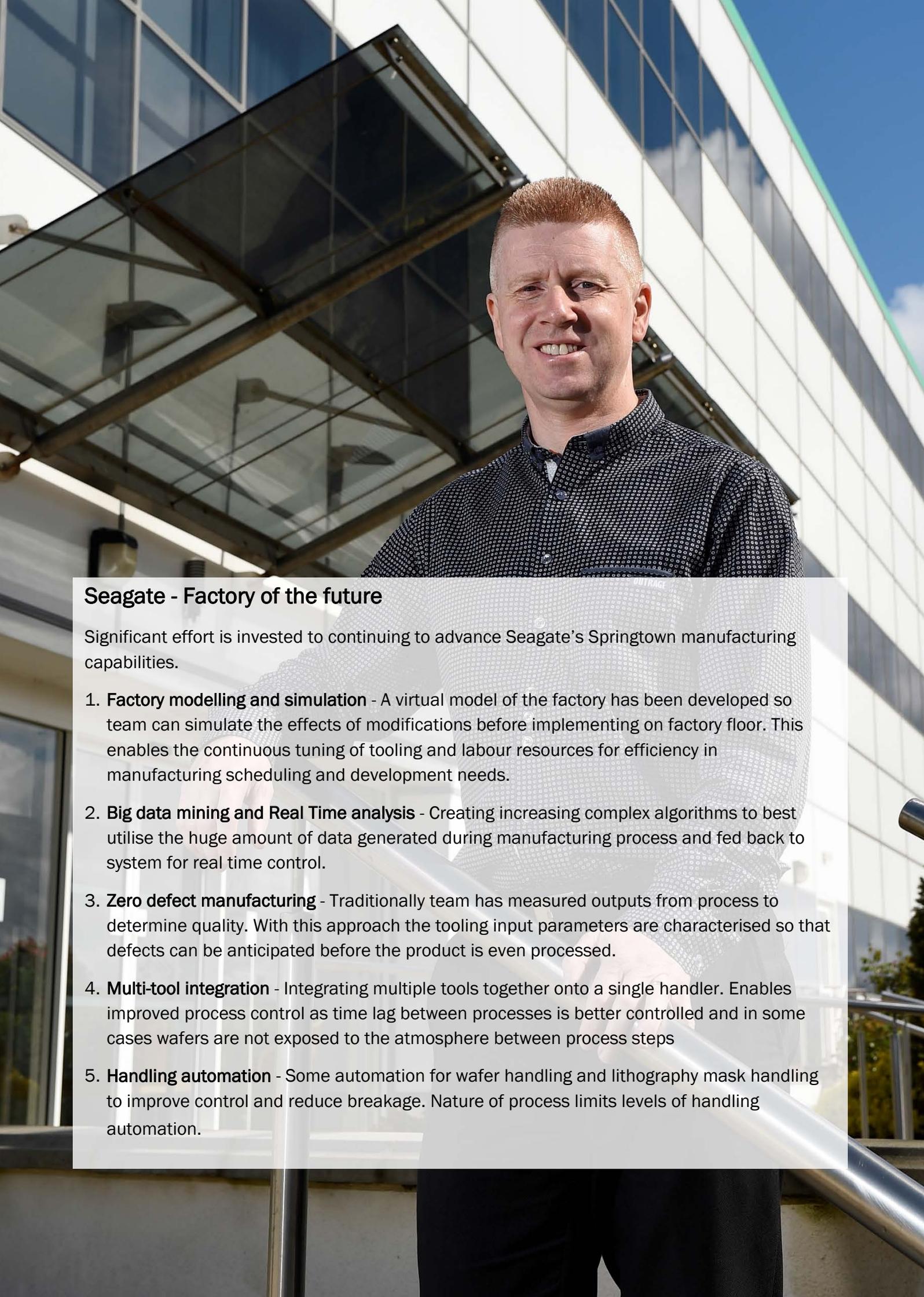
Our customers want more memory but they also want costs to stay flat, so R&D is absolutely crucial to what we're doing here at Springtown.” In fact, some 40 PhD graduates have been added to the Springtown team in the past few months to work on pioneering new HAMR technology .

The plant is currently working on a new generation of Heat Assisted Magnetic Recording (HAMR) technology....a means of making the magnetic devices smaller without the risk of them becoming less stable.

Storage has come a long way since the early days of computers. Back in 1956, IBM introduced the first hard disk drive at an aerial density of 2,000 bit/sq.inch. Last year, Seagate produced a hard drive at a density of 1.34 Tbit/sq/inch.....around 600 million times that of the first IBM disk.

“It is hard to get an idea of the kind of measures we're working in. It's right down to a few nanometers now.....half a dozen atoms, if you like.” A nanometer, for reference, is one billionth of a metre.

“The thing about this industry is that there is no stationary state. If we don't keep going forward in terms of what we're achieving, we'll start going backwards. And that's really not an option in an industry like this one.”

A man with short, reddish-brown hair, wearing a dark patterned button-down shirt, stands smiling in front of a modern building. The building features a large glass canopy structure above him. The background shows a clear blue sky and the building's facade with large windows and a green trim along the top edge.

Seagate - Factory of the future

Significant effort is invested to continuing to advance Seagate's Springtown manufacturing capabilities.

1. **Factory modelling and simulation** - A virtual model of the factory has been developed so team can simulate the effects of modifications before implementing on factory floor. This enables the continuous tuning of tooling and labour resources for efficiency in manufacturing scheduling and development needs.
2. **Big data mining and Real Time analysis** - Creating increasing complex algorithms to best utilise the huge amount of data generated during manufacturing process and fed back to system for real time control.
3. **Zero defect manufacturing** - Traditionally team has measured outputs from process to determine quality. With this approach the tooling input parameters are characterised so that defects can be anticipated before the product is even processed.
4. **Multi-tool integration** - Integrating multiple tools together onto a single handler. Enables improved process control as time lag between processes is better controlled and in some cases wafers are not exposed to the atmosphere between process steps
5. **Handling automation** - Some automation for wafer handling and lithography mask handling to improve control and reduce breakage. Nature of process limits levels of handling automation.

