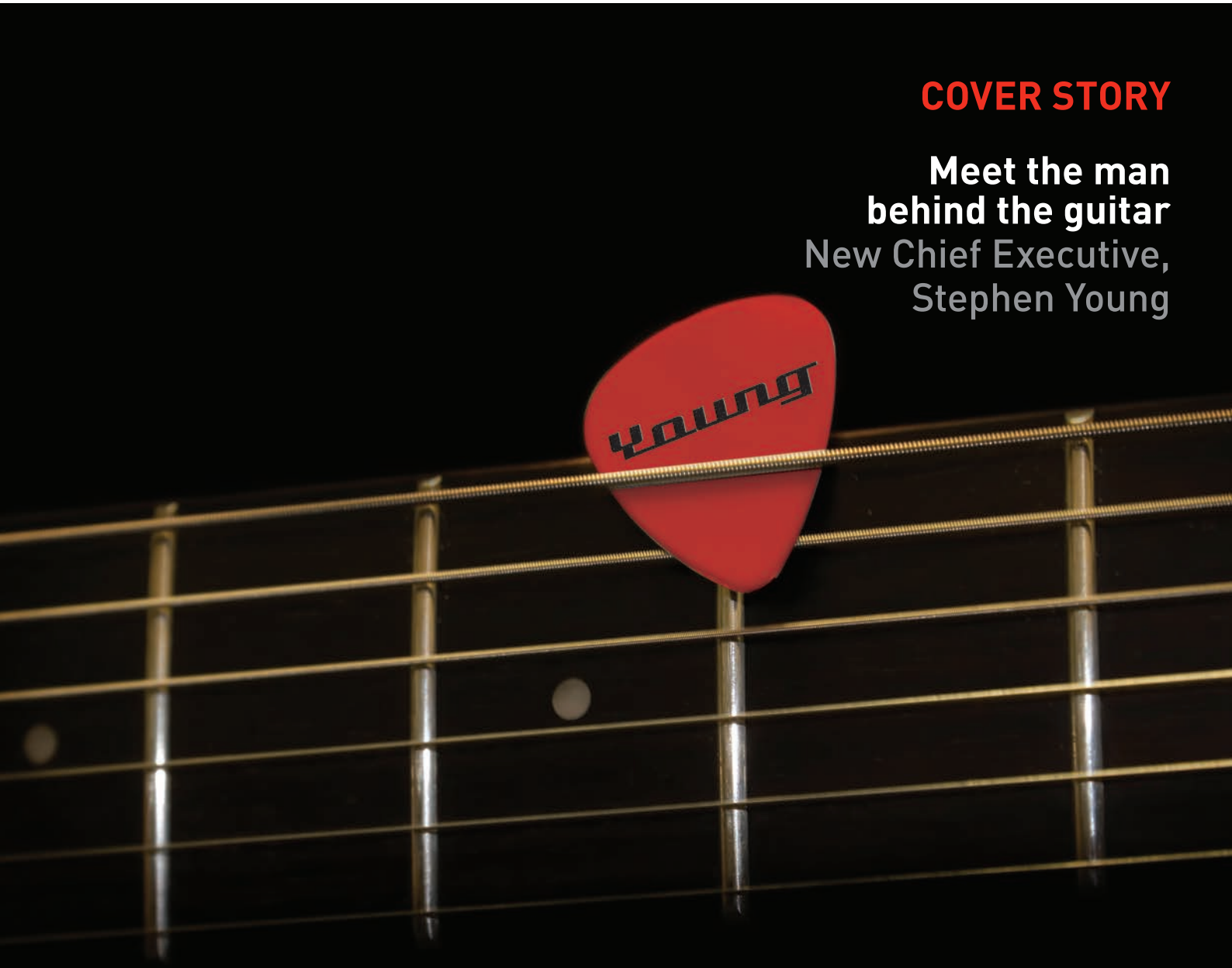
REVIEW

A MAGAZINE
FOR EMPLOYEES

SUMMER 2013



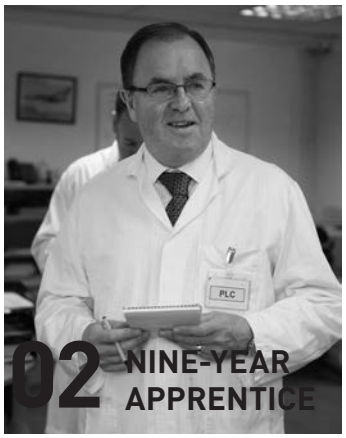
COVER STORY

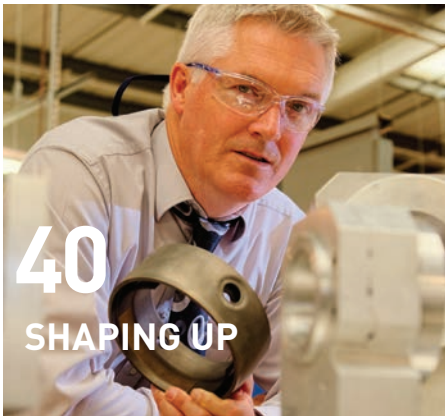
Meet the man behind the guitar
New Chief Executive, Stephen Young

PLUS

Yellow Belt, Green Light Who was the Meggitt Production System Lean Academy's first graduate? • **Shaping up** Yes, we're 3-D printing, too • **Influence is the new power** How to succeed in Meggitt's global matrix structure • **iRoom** Teleconferencing, Meggitt Avionics-style • **Good vibrations** Meggitt Sensing Systems, Denmark is taking off • **What is power without control?** Meggitt technology keeping the lights on

MEGGITT





Taking up the reins

It is a great pleasure, as your new Chief Executive, to introduce my first edition of the Meggitt Review.

As you will see, amidst many excellent pieces showing how the group is moving forward, the editor has seen fit to set aside a little space to enable me to set out who I am and where I intend to take our business.

Meggitt may be a large business of some 11,000 individuals but it is still of a size that many of us can connect with each other on a personal level within sites and across the boundaries of business unit or division. Employees can expect to see plenty of me in the business units and on the factory floor too. That's the heart of Meggitt.

The roots of this "connectivity" stem from the Transformation phase of 2009/2010. That is when we started to create uniform processes and speak the same language—and all within coherent customer-oriented capability-based SBUs. When you streamline, you go faster.

Now, we are seeking even more connectivity and speed through the Meggitt Production System (MPS) in which everyone, at every level, will have a voice. Essentially, the system enables everyone, whether they work on the shopfloor, or in an office, to think of—and put in place—ways to improve what they do, all day, every day. It really is taking the old Meggitt and standing it on its head. We are transferring power—decision-making—to the right levels of the organisation, starting with the people who make our products—where else?

And you can rest assured that we are investing very significantly in embedding MPS capability inside the organisation for the long term. We've started with a team of 80 extra recruits, for example, so that everyone gets the training, the tools and the resources they need to solve problems and make the best decisions.

And why? Customers want fewer, better suppliers. They are raising the bar in terms of quality and programme delivery. Those that meet the new standard will prosper. Further, cutting out waste means more money to invest in other things plus more professional fulfilment for all employees.

We are a very successful business and yet the opportunities to be even more successful by addressing 'execution'—quality and on-time delivery—are significant. By improving in these areas, we will deliver more growth, free up cash to reinvest in the business, reward our shareholders and make more acquisitions.

If we do all this, there is no reason why we cannot double the size of Meggitt every five or six years, providing even more value for shareholders and more opportunities for employees. That's my mission for Meggitt.

We have a great deal for which to thank our departing Chief Executive, Terry Twigger, not least for initiating the Meggitt Production System. This provides the essential basis for taking the company forward and I will do everything in my power to ensure its success.

Stephen Young
Chief Executive

Turning Meggitt on its head

Coming soon: a film of new Chief Executive Stephen Young in which he shares his vision for the group with journalist Tom Maddocks. Young will continue to change Meggitt's management culture from one with "a tendency toward command and control" to another in which employees can give of their best, empowered at all levels, across all functions. The big lever for change is the progressive implementation of the Meggitt Production System, which he says will "turn old Meggitt on its head" to meet its customers' ever more stringent quality and delivery standards. As for the business as a whole: Young wants to double the business in five years based on acquisitions and 10% per annum organic growth targets, again enabled by the Meggitt Production System.

View the film in The Conversation employee communications space on Sharepoint, via the e-mail link coming to your in-box soon or, if you do not have a laptop or PC at work, via your site HR people.

NINE-YEAR APPRENTICE

As Stephen Young takes to the helm, Review asks him about the transition from the group's Chief Financial Officer to Chief Executive, about acquisitions and group strategy and why the Meggitt Production System is his top priority.

Some Chief Financial Officers want to keep their noses stuck firmly in the accounts. "Nothing wrong with that," says Meggitt's new Chief Executive, Stephen Young. "It's a matter of preference, of course, but the way I have always played the CFO role is as business partner to the CEO. I am the guy on the board who happens to be good at numbers but first and foremost, I love getting into the business side of things. I am a very commercial animal."

After leaving school with double Maths, Physics and Chemistry A-levels, Young acquired an honours degree in Maths on a Royal Air Force scholarship. "I have loved planes ever since I saw a Lightning take off on a rapid intercept at the Farnborough Air Show way back. Unfortunately, I was rather better at numbers than flying so they wanted me to be a navigator. I said 'thanks but no thanks.'"

Instead, Young set out on a new flight path, qualifying as a management accountant. "I wanted to work for the best people in the best companies with the best products." These companies included Ford, Mars and Diageo, where he had the opportunity to rub shoulders with leading lights in British and international industry—Allan Leighton, Justin King, Simon Duffy and Paul Walsh amongst them. "While they were all very different, what they had in common was the ability to cut to the heart of a problem very quickly."

The last of Young's great leaders was Terry Twigger, whom he succeeded in May. Twigger was at the helm of Meggitt as CFO and Chief Executive for 20 years. During that time, revenues grew from £345 million to over £1.6 billion. Today, the group stands on very firm foundations, equipped to continue on the next phase of its growth trajectory. Young observes: "That was, in large measure, due to his excellent perspective on what was important and an ability to get things done. Thanks to Terry, the cultural norm of our operating board is to face up to difficult decisions, often in difficult times, and make the right ones quickly."

YOUNG SPENT WHAT TURNED OUT TO BE A NINE-YEAR APPRENTICESHIP for the role of Meggitt's Chief Executive, taking virtually every important decision about the group's future with Twigger. One of the biggest and perhaps most difficult decisions was taken in 2009. Young recalls: "We had to take this very successful business called Meggitt and move through a process we called 'Transformation' to make it even better. With a fully-fledged recession in the background, this undoubtedly put a lot of stresses and strains on the business. The easy thing would have been not to do it but we are in a much better place and ahead of our peers because of it."

One of the great benefits of Transformation, Young reminds us, is that the group presents itself as 'Meggitt' as opposed to a collection of businesses with different names, often duplicating effort and even competing against each other. "In the past, customers would look at us and have no idea of our true scale and capabilities. We would drive them mad with multiple points of contact. And when they saw that several 'small' Meggitt businesses were struggling on existing programmes, they would worry about whether we had the engineering muscle to work on new ones. Today, they see us as much more joined up, much more significant in terms of scale and capabilities, bigger pools of engineers and much easier to do business with. This is where Transformation has brought us."

The Meggitt Production System is the most important initiative for us over the next five years and I am walking the walk

WHAT CAN EMPLOYEES EXPECT FROM YOUNG IN HIS FIRST 100 DAYS? Young is enthusiastic about the strong capability-based divisions that emerged from the Transformation process and the customer benefits that came with it. However, as Meggitt has become bigger with the Pacific Scientific acquisition, divisional management has tended, of late, to visit the group's UK headquarters for business reviews. He'd like to change that. "I want to see more customers and more factories. I will be seeing people on their own territory and really taking the temperature of our businesses first-hand."

He recalls his role over six years at Ford where he was responsible for capital investment in factories. "I always made sure I walked the floor, saw current processes and understood the impact the proposed investment would have on them. Actually, I was fascinated by manufacturing and making cars so in a sense the investment appraisal was a convenient excuse to go out there and have a look. Fundamentally, however, my visits were important sense checks."

This interest in production was manifest within hours of taking up his new role at Meggitt. With Robin Young, Group Organisation Development Director and

CV Stephen Young

Meggitt PLC (2004 to 2013)
Group Finance Director
Board member responsible for finance, IT and investor relations

Thistle Hotels plc (2000-2002)
Group Finance Director
Board member responsible for finance, investor relations, IT and procurement

The Automobile Association (1998-2000)
Group Finance Director
Board member responsible for group and main subsidiary's finance functions (including financial control, planning, tax and treasury) plus centralised IT, property and procurement

Thorn EMI plc (now EMI Group plc) (1991-1998)
Group Financial Controller
Responsible for financial reporting, planning and analysis, internal control and audit, mergers and acquisitions. Significantly involved in investor and City relations. Managed demerger of Thorn from EMI.

The Touchstone Group plc (1991)
Managing Director Designate
Firstpoint Limited

Grand Metropolitan plc (now Diageo) (1988-1990)
Vice President, Asset Management
Food Sector, Minneapolis USA, 1989-90

EMEA Vice President Finance
Intercontinental Hotels, 1988-1989

Mars Incorporated (1983-1988)
Finance Manager, International Marketing division, 1985-1988

Mars Confectionary
Commercial Accountant, 1985

Financial Planning Accountant, 1983-1985

Ford Motor Company (1977-1983)
Broad and thorough training in all aspects of commercial accounting and finance

Thornton Baker (1976-77)
Trainee accountant

EDUCATION AND TRAINING

Pure Maths, Applied Maths, Physics and Chemistry A-levels
BSc Hons Mathematics, University of Southampton
Fellow of Chartered Institute of Management Accountants (FCMA)

Damian Pearce, Corporate HR, he spent two days in the classroom and a day on Meggitt Avionics' factory floor, earning the first Meggitt Production System (MPS) Yellow Belt from the Meggitt Learning Academy. Why? "MPS is the most important initiative for us over the next five years and I am walking the walk."

The Meggitt Production System is a methodology—a way of creating a continuous improvement culture. By integrating Lean manufacturing tools to speed up processes and Six Sigma to improve accuracy, the system will enable Meggitt to consistently meet the very high standards of quality and on-time delivery its customers are demanding.

While Young found the Transformation process challenging and exciting, he is equally excited about the Meggitt Production System. "We have reorganised the business and improved the group by successfully integrating some great acquisitions. We are now easier to do business with but we need to improve execution."

He explains: "In the past, being 'good enough' in programme management, cost, quality and delivery enabled Meggitt to win business. In future, however, 'good enough' will not be good enough!

"Our customers are quite clear that they want fewer links in their supply chains. The way they will do that is by raising the bar on cost, quality and delivery and the winners will be the suppliers who continue to jump over the bar.

"We must attain the very high standards being set through 'Gold supplier' and similar programmes. If we don't, the likelihood is that we won't be able to bid on important programmes—even if we have the best products.

"Quite simply, it is about survival of the fittest and, given the calibre and dedication of Meggitt people, I know we can get there."

> I am the guy on the board who happens to be good at numbers but first and foremost, I love getting into the business side of things. I am a very commercial animal

Meggitt Production System is not an initiative that Young takes lightly. This includes the impact it will have on the workloads, initially, of those who have to learn it, before they can work by it and realise its great benefits.

"You cannot take a bunch of busy people and ask them to do a whole lot more work. We have to put in the investment if we want to make this happen. My board and I recognise our responsibility to equip our people for success."

To that end, many millions of pounds have been committed over several years for its implementation—piloting MPS at one site and rolling it out at 12 others this year alone. Some 80 new recruits are rolling out the Meggitt Production System in a controlled way across the group.

LOOKING AHEAD, WHAT NEXT FOR MEGGITT?

Young draws attention to the aircraft programmes that will enter service in the next few years, generating a likely organic growth rate from the group's existing businesses of around 6 to 7 per cent over the medium term.

However, successful implementation of the Meggitt Production System should increase that rate of growth significantly, he says "We have got great technology, a massive installed base and an enduring annuity in terms of our aerospace aftermarket business. That's a great platform to build on. The industry-leading performance on cost, quality and delivery the Meggitt Production System will give us should mean we win more than our share of new business—and with better organic growth and the right acquisitions—should they become available—there is no reason we cannot double the size of Meggitt every five or six years."

Young finds M & A [mergers and acquisitions] work very appealing. "If you buy the right company for the right reason you can get significant benefits—access to new markets and capabilities, a better portfolio of products and economies of scale. There is a statistic out there that says that more than half of acquisitions fail but if you talk to Meggitt shareholders, they regard our acquisitions as successful for all these reasons."

At the same time, the practice of M & A, can be painful, too, with excitement and

Young takes a walk with a flight display

In his successful bid to attain the Meggitt Learning Academy's first 'Yellow Belt', Stephen Young found two days of Lean tutorials fascinating but the real proof of the pudding was in the eating—getting out on to the factory floor for a third day to put the principles into action.

"We were lucky enough to walk in the footsteps of Meggitt Avionics management team who had created a value stream map for its integrated secondary flight display. We physically walked the production process and I wore out a pair of shoes—the product was 'in the system' for 188 days and was having something done to it for just 18 hours. Then we analysed the flow of information associated with that product. The biggest lesson learned for me was the importance of the latter.

"Take excess inventory, for example. When you look at how the inventory got there, it is actually the consequence of many pieces of information, processes, transactions and decisions. Once you recognise that and break it down, you can tackle each element and make progress.

"Breaking down the links in a chain and tackling them separately—or together if they are related—is familiar and very necessary to my role. However, Lean gives you a set of tried-and-tested tools and processes for doing this, enabling you to take something intrinsically complicated and make it simpler. We have a big opportunity and the Meggitt Production System will help us realise it."

disappointment in turns in the quest for the right targets.

"It's a game of patience. By and large we have a good radar screen of opportunities and we know what we would like to bring into the Meggitt family. Typically, they are not available then one day something changes and you have to spring into action. We probably tried to get PacSci [Meggitt's latest acquisition] for about 10 years and there were similarly lengthy timescales before we acquired Dunlop Aerospace and K&F [the antecedent of Meggitt's Georgia-based polymers and Ohio-based braking systems facilities].

"We know what's out there in terms of aerospace and defence that would be a good fit for us but we do not yet have as much knowledge as we would like in terms of energy acquisitions. We are building that knowledge. At the same time, we are not going to go into what is essentially a different market with a different technology. We will continue to build on what we know well and move out from there."

Meggitt has focused on aerospace and defence for many years and its energy business has, largely, been a sector to deploy existing aerospace and defence technology. That is now changing. We are going more onto the front foot of our energy businesses. Says Young: "There is a lot more to play for in terms of what our existing businesses can take from the energy sector from building on our product ranges to establishing more regional sales offices." What monitors the condition of aero engines can monitor industrial gas turbines. What controls the movement of fluid in aero-engines can do the same in large power plants and pipelines.

The need to optimise inherently inefficient modes of power generation, particularly in developing economies, plays to the strengths of Meggitt Sensing Systems. Its condition monitoring capabilities enable operators to schedule effective maintenance and maintain operational safety. There are opportunities for Meggitt Control Systems to expand its aerospace-derived valves into energy too.

Heatric, Meggitt's Poole, UK-based advanced heat transfer engineering business, is different. Its high-duty compact heat exchangers have made their mark in the oil and gas sector and its latest contracts centre on gas compression, gas injection and CO_2 separation modules in remote floating production, storage and offloading vessels. Meggitt's energy businesses grew by 45% in 2012, on the back of 30% growth in 2011 and Young is keen to complement this very attractive organic growth with acquisitions.

While customers are raising the bar on delivery and quality, especially in aerospace, Young does not see Meggitt's business model changing. "Meggitt is about developing intellectual property, for highly regulated markets, often for assets with very long service lives in very harsh environments and on a sole-source basis.

"An aircraft programme is out there for 30 years or more from the first one produced to the last one grounded. On the military side it can be up to 80 years. We have an installed base of 60,000 aircraft, all needing our spares on a regular basis. So, mixing metaphors, our aerospace business is like the proverbial ocean-going tanker. There is huge momentum behind it and that is not going to change in the foreseeable future."

And while Meggitt's energy businesses have shorter programme life cycles, they conform entirely to Meggitt's strategy fundamentals. 'Smart engineering' is where Meggitt focuses its technology investments, typically for programmes where there is a high degree of certainty the group will get a return on its spend.

Intimacy with its customers' plans, helped by Transformation, has enabled the group to align its technology developments more closely to their likely requirements. "I see this as particularly important when it comes to aerospace," says Young. "After decades of small incremental changes we are now seeing some big ones, in most cases driven by the need for light, more fuel-efficient and more reliable aircraft. These include disruptive technologies such as additive layer manufacturing, composite structures, more electric power systems and much higher engine operating temperatures. We are making sure we have appropriate developments in these areas but we may need to acquire new capabilities."

Young aims to spend about 10 per cent of his time on investors. "We have £3.8 billion of their money so they need to know what is happening to it. They get a return in the form of dividends and capital growth. They have choices about where they put their money so ensuring their continued support is very important.

"We put many hours and many miles into shareholder relationships, building trust. Regular delivery of good financial results and good dividends against our strategy year on year, underpins that trust. It is a big factor in persuading them to trust us with even more money when it comes to transforming acquisitions.

MEET THE MAN BEHIND THE GUITAR

Young's office features a Gibson SG solid-bodied classic electric guitar. "It is there as an instrument of torture," he says. "If people miss their forecast, I play them a tune and they don't miss their forecast twice.

"That's a way of saying that I am actually not a very good player but find it immensely therapeutic. The intention was to pick it up from time to time but there never seems to be any. In fact, Terry Twigger hid it once and I didn't notice for a couple of weeks. I try to get to a lesson once a week but the truth is it is not a hobby I have time to pursue at the moment." This is much to the delight of one of his sons, a skilled musician from whom Young says he should be taking lessons. The Gibson is one of a collection of 26 classic guitars that furnish the family home. "Some people have sculptures and pictures around the house—I leave guitars lying around because for me they share the same beauty."

IF YOU LOOK AT THE ACQUISITIONS we could make; the products we could develop; and the platform positions we could win. And if you look at the significant improvements we can make in our operating performance—quality, delivery, productivity—there is so much we can do to make this great business even better.

"There is a lot to go for and I am looking forward to working with all our employees to make the next ten years as significant for Meggitt as the last ten." ●

You can read more about Meggitt Production System in the first 18 pages of the Winter Edition of the Meggitt Review on line at www.meggitt.com. Meet Meggitt Production System recruit and Lean Master, Michael Faney, Global Process Leader, Meggitt Production System on page 8 of this edition.

Yellow Belt, Green Light

New CEO Stephen Young recently became the Meggitt Production System Lean Academy's very first graduate. In winning his Yellow Belt he was doing much more than simply 'walking the walk'. What did he learn and why does it matter?

Chief Executive Stephen Young has become the first person in Meggitt to earn Yellow Belt accreditation from the new Meggitt Production System (MPS) Lean Academy. Why? Says Young: "MPS is the most important thing for us over the next five years, so leaders must 'walk the walk'. Our customers are continuously raising the bar on cost, quality and delivery. By integrating Lean manufacturing tools to speed up processes and Six Sigma to improve accuracy, MPS will ensure that we can clear that bar at each new level. Nonetheless, I know we are asking a lot from everyone in the company, so it's important for Meggitt's leaders to set the right tone and to make sure that we too are doing our best to embed Lean."

At a practical level there isn't a role or function in Meggitt that won't benefit from Lean methods: "I've been recommending the Yellow Belt experience to everyone," he says. "Lean gives you tried-and-tested tools and processes for making intrinsically complex problems much simpler and more tractable. Operations is the priority now but these tools apply to all aspects of our business. We will be rolling them out far beyond operations in due course under the aegis of the Meggitt Business System. And when we are all 'Leaning out' the weekly shopping, then we'll know that we have really got it."

> I know we are asking a lot from everyone in the company, so it's important for Meggitt's leaders to set the right tone and to make sure that we too are doing our best to embed Lean

From the left: Meggitt Lean Academy Yellow belt graduates Damian Pearce, Director, Corporate HR; Stephen Young, Chief Executive; Robin Young, Group Organisation Development Director, flanked by Meggitt's Lean faculty from whom they received their certificates: Michael Haney, Global Process Leader, Meggitt Production System (left) and Louis Chavez, Director of Meggitt Production System (right).

Just like any other student, Young took three full days to win his Yellow Belt. The first two are spent in the classroom, systematically learning about the fundamental tools of Lean and the theory of their use in addressing various performance pain points. The third is spent putting the new ideas and principles into practice; probing, questioning and analysing in a live production environment. In Young's case that meant Meggitt Avionics: "I am no great fan of sitting in a classroom. These things fall into place for me when I can get stuck in and put them into action. I was fortunate to walk in the footsteps of Meggitt Avionics' own management team who'd recently created a value stream map for the integrated secondary flight display. We physically walked the production process, analysing the associated information flows as we went. That was one of the biggest lessons for me—the importance of information flow in production."

A PLAN FOR EVERY PART There are two threads to a value stream; material flow and information flow. When it comes to looking for potential improvements in a value stream map, there are always issues in both. Young's tutor was newly-appointed Meggitt Learning Academy 'principal' and Meggitt Production System Global Process Leader, Michael Haney: "We break down the supply chain from a delivery perspective and look closely at it through the prism of the Lean technique called 'a plan for every part', which aims to create a single, joined-up, door-to-door handling system for each purchased thing. Without a plan for every part companies find themselves running production cells on Lean principles

> When we are all 'Leaning out' the weekly shopping, then we'll know that we have really got it

but seamless production continues to elude them because the systems that supply the cells are still steam-driven, disrupting flow, wasting time and forcing up inventory."

This particular dynamic struck a chord with Young: "If it's not well-managed, inventory can become a heavy burden for an organisation like Meggitt. The plan-for-every-part approach reveals how inventory management is really a whole-body activity. Any given level of inventory is actually the consequence of many separate pieces of information, processes, transactions and decisions. Once you recognise that, break it down and tackle each element, you soon make progress solving the headline problem. Isolating the links in a chain in this way and tackling them separately—or together, if appropriate—is a familiar part of my own role as Chief Executive."

"These Lean tools are so powerful because they are simultaneously the scalpel and the microscope," adds Haney. "They help you get much more granular with your questioning because you can see so much deeper into the problem."

VALUE STREAM MAPPING An important practical challenge for all Yellow Belt trainees is to create their own value stream map. If they come from an environment other than production they need to choose a process they know really well even if they don't work in it. Stephen Young is a life-long admirer of that great musical device, the Fender Stratocaster (he has ten in his collection of 26 guitars). So, with his musician's hat on, he chose guitar-making for his value stream map: "These instruments are things of such great beauty. True works of art. But they are also complex, specialised tools made from high quality materials transformed by craftsmen using precise techniques. I've been fascinated by guitars since my teens so this exercise was a double pleasure; helping me to see guitar-making in a new light while gaining a better understanding of what makes manufacturing processes tick."

With his musician's hat on, he chose guitar making for his value stream map

For Haney—too recent an arrival at Meggitt to have experienced his Chief Executive's fabled 'instrument of torture', an old Gibson propped in the corner of his office—it was an unusual choice but a good one all the same: "A process is a process. Students need to be able to break down a complex manufacturing process and start thinking about the kinds of questions that will reveal its potential for Lean improvement. Guitar-making works fine for that. We started with the moment the instrument is ordered and walked through the whole thing: suppliers, componentry, materials, acoustics, the quality and lead-time expectations of the customer and all the rest. Stephen's quite a guitar addict and he really knows his Strats!"

EIGHT KINDS OF WASTE As you'd expect, the key insights Young took from his value stream exercise tend to have broad applicability for the work done all over Meggitt, not just on the factory floor: "Exercises like this teach us that any activity which doesn't add value to a product or service is, in effect, 'waste'. If we do something that the customer is not willing to pay extra for, then we have wasted something. Lean thinking identifies 'eight kinds of waste' for elimination; not just scrap and defects but things like waiting time, avoidable materials movements, transportation delays and perhaps most important of all, thwarted talent." ●

Releasing waste to release energy

Robin Young, Group Organisation Development Director, learned this from the Meggitt Production System Yellow Belt course: "Operations conceal a great deal of complexity and within that, waste. People haven't actively created it, they have become saddled with it as a business has evolved—new products and programmes, even new machinery all contribute as operations tries to make everything fit, often in the same space. Add up the compromises that are wrapped up in this evolution and the amount of waste hidden within it can be startling—but very exciting. With the right resources embodied in the Meggitt Production System, the opportunities to release waste and therefore energy in our already highly successful business are legion. That energy can be deployed elsewhere—growing the business.

I am happier dealing with the big picture than detail but I was reminded that releasing the energy from waste is about diligent hours and hours of careful analysis. Sometimes, however, it is just deciding to do what needed to be done that you would have done some time ago if you had only been allowed to do it.

And that's what will change with the Meggitt Production System. Employees will be allowed to take that decision, supported by training that enables them to see the waste and understand how to release it.

And waste release will be everyone's responsibility, not just the responsibility of the large numbers of highly skilled people we have recruited into the organisation to progress MPS. In fact, the MPS team's mission is to embed capability within Meggitt, training others who will go on to train others, leading to an army of practitioners throughout Meggitt, all solving problems at all levels and relentlessly seeking opportunities to improve processes without the old compromises.

Soul food

Meggitt is maturing as an organisation. Investment in the fabric of our facilities is there for all to see. Less tangible but no less important is the investment we make in people and systems. Meggitt Production System is one and probably the most all-encompassing and far-reaching in human terms. This is about levels of empowerment that are good for the soul as well as the business.

Taking it slowly ... *to go fast*

At Honeywell, Michael Haney helped design and introduce an industry-leading corporate operating system. Now he's arrived to help Meggitt do the same. We went to meet him.

From machinist to global continuous improvement leadership, Meggitt's new Global Process Leader knows how to 'build from within' to sell new ideas.

Michael Haney, Global Process Leader, Meggitt Production System, may be new to Meggitt, but in every other sense he's coming home. Back to the sector he loves—"I grew up in aerospace and I'd begun to miss it"—and back to the job he loves, implementing brand new operating systems.

For the six years to 2010 he was Honeywell's global director of the Honeywell Operating System (HOS). Now he's come to Meggitt to work closely with Meggitt Production System Director Louis Chavez to develop and launch the Meggitt Production System (MPS). "There aren't too many people out there who were involved from the start in creating a brand new operating system for a major global aerospace company, as I was at Honeywell. So my new role here at Meggitt feels like a great fit," he says.

In fact Haney arrives from Thermo Fisher Scientific, the scientific equipment and services multinational. As Global Director of Operations and Lean Enterprise for its $1 billion biosciences division (3,500 people, 22 locations, 13 countries) he restructured the global manufacturing base, saving $9 to 12 million annually. Haney was also in the process of establishing a cross-divisional strategy to take advantage of manufacturing synergies in regional centres in Lithuania and China that would lead to efficiencies of up to $150 million.

During 22 years at Honeywell Haney rose through the operational ranks—machinist, team leader, site manager, area manager—before being given his first international role. Providing strategic operations management for plants in China and the Czech Republic, he introduced a

new lean manufacturing model that cut new product lead-times by 40% and developed strong and self-sustaining 'pipelines' of local leadership and engineering talent. The two Chinese plants became Honeywell's first aerospace sites to hit 100% OTD (on-time delivery) and single-digit ppm (parts per million) quality scores.

In 2004 Haney was made responsible for leading continuous improvement worldwide, as Director of Honeywell Operating System (HOS). Fast forward to 2009, his last full year at Honeywell, and HOS-related activity was delivering $76 million of productivity improvements and in less than 18 months Haney had enabled five manufacturing sites from a standing start to achieve Lean 'Bronze'.

MORE HASTE, LESS SPEED That's quite a track record, even in the world of Lean enterprise where 'master' practitioners like Haney can't win their spurs without first having made a very substantial, fully-audited contribution to the bottom line. (In his case worth $10 million to Honeywell.) So ask him about the single most important thing he's learned from 25 years in 'ops', much of it designing and implementing state-of-the-art corporate operating systems, and you are in for a surprise.

PATIENCE he says immediately. "The Meggitt Production System promises so much. The sites are hungry for success. We are all impatient to see the benefits rolling in. But these things always take longer than you expect. The temptation to set tight timescales must be closely coordinated with the sites' integrated performance plan. It is a mistake to assume you will magically crank forward the benefits. I've seen too much of this before—someone sets a 13-week schedule and before long everyone feels like they are drinking from a fire hose. Three months become six, then twelve, but it's more like two years before you have what you really want, change you can feel as well as see. In this line of work you have to go slow to go fast."

This is the voice of experience hard won. Haney started out in aerospace production in 1988 as a CNC machinist. In a long career he's seen plenty and had his fair share of fire hose moments along the way. "At times like this, when there's lots of change, lots of learning, lots of visits, we have to be careful how much we throw at people. Go too fast and they'll feel like it's being done to them, not with them. The benefits won't stick because most are by necessity still doing it all by numbers. if we want them to become what we know the MPS needs—people whose commitment and creativity will sustain Meggitt and the MPS far into the future—we have to give

> MPS isn't just another project or initiative. It's about changing the way all projects and all initiatives are accomplished

What is MPS?

The Meggitt Production System is a single, coherent, highly efficient system for streamlining, re-energising and continuously improving the quality and timeliness of everything Meggitt does at its production sites. In spite of the name, that means not just machinery, raw materials and making things on the shopfloor but everything else too. From sales to shipping—order entry, sourcing, finance, compliance and much more besides. If you work in a Meggitt factory, you work in 'production' and MPS will help you to improve continuously the things you do—and have more fun doing them. Meggitt production system is being spearheaded by the group's operational excellence function, led by Amir Allaverdi, Group Operations Director. It encompasses group procurement and quality.

OPERATIONAL EXCELLENCE

SPEED READ

Taking it slowly ... to go fast

GLOBAL IMPROVEMENT
For six years, as global director of the Honeywell Operating System (HOS), Michael Haney lead Honeywell's continuous improvement worldwide. He spent 22 years in production at Honeywell, starting out as a CNC operator. Now he is Meggitt's new Global Process Leader helping develop and launch the Meggitt Production System (MPS).

BELT UP
Haney will also create and lead Meggitt's new MPS Lean Academy. Students will follow a highly structured curriculum through the five levels of Lean certification: Fundamentals, Yellow, Green and Black Belts, culminating in MPS Lean Master status for Black Belt 'experts'. Most of the training is done 'on-the-job'. "In three to five years we plan to have trained everyone in Lean fundamentals, with 30% having progressed successfully to Yellow Belt certification, 10% to Green and 3% to Black or Master," he says.

LEADING BY EXAMPLE
The Lean Academy's first Yellow Belt graduate is none other than Meggitt's own chief executive, Stephen Young. "It was a phenomenal experience for me," says Haney. "Pretty much my first assignment was taking Meggitt's Chief Executive through the Yellow Belt curriculum! Stephen is truly leading by example and he deserves a lot of respect for it." Young's enthusiastic endorsement of the Yellow Belt experience has given the embryonic academy instant credibility.

them the time they need to take everything onboard and make it their own."

As Haney likes to remind anyone who will listen, the MPS is about so much more than simply changing the way things are done on the shop floor: "MPS isn't just another project or initiative. It's about changing the way all projects and all initiatives are accomplished. Yes, we want to improve our financial results but this is also about making sure Meggitt is an employer of choice—a place people want to work, and want to stay working, because they have a strong sense of pride and ownership in what they do. Which means this is essentially a cultural transformation and its pace will be governed fundamentally by the speed at which hearts and minds can be changed. From site to site, business to business, the pace will vary—but in a word that means slowly."

LEAN FORWARD It's a founding principle of MPS that Meggitt will as far as possible grow its own capability. A key part of Haney's new remit is to build a strong pipeline of home-grown talent and expertise. Drawing on his long experience of training and development in a Lean environment to create Meggitt's own MPS Lean Academy, he will work with corporate HR Director Damian Pearce to improve succession planning too.

Haney visibly relishes the prospect. "Building from within", as he calls it, is a touchstone of best practice in Lean conversion: "The more you build from within, the more open and receptive people are to new ideas. The more willing they are to embrace the new, the sooner they are practicing continuous improvement every day themselves—and not because they've been told to but because it feels right."

Value stream mapping at Meggitt Avionics *Above:* Jonathan Bradley, Continuous Improvement Facilitator, Meggitt Avionics, with Michael Haney, Meggitt Production System Global Process Leader and Meggitt Chief Executive, Stephen Young.

It's a founding principle of MPS that Meggitt will as far as possible grow its own capability

As well as making Meggitt more cost-effective (fewer consultants), building sustainability in Lean expertise will also make the company more nimble and responsive because that expertise will naturally tap into a deep understanding of Meggitt and its people. As important, says Haney, it will help make Meggitt a better place to work and develop a career: "The Lean Academy offers great professional growth opportunities because these are cutting edge skills we are developing, and all within the over-arching Meggitt-wide training philosophy of 'equipping people to win'."

At this point in MPS development it would be naïve to think that Meggitt can find from within all the experience and knowledge it needs—but it's only a matter of time says Haney: "I haven't yet fully evaluated the talent we have but it is clear that Meggitt already has sharp and knowledgeable Lean people in the organisation. The Lean Academy will enable us to build on their expertise to grow the greater depth of knowledge in MPS tools, concepts and methodology that we need to create a self-sustaining ability to drive continuous improvement across the entire organisation."

Students will follow a highly-structured curriculum taking them through the five levels of Lean certification: Fundamentals, Yellow, Green and Black Belts, culminating in MPS Lean Master status for Black Belt 'experts' with at least two years' practical experience. All four belts are tool-based to a specific level of expertise. The Yellow curriculum is about learning the fundamentals of what Lean can do for a business and developing the ability to observe, identify and interpret

Lean opportunities in processes. Typically only 30% or so of the learning will be in the classroom or text-based, with the remaining 70% acquired on-the-job. To become fully certified, each Green, Black and Master practitioner will also be expected to use their new skills to make a defined, fully-audited contribution to Meggitt's bottom line. And once certified they will mentor a colleague working towards his or her own certification. "In three to five years we plan to have trained everyone in Lean fundamentals, with 30% having progressed successfully to Yellow Belt certification, 10% to Green and 3% to Black or Master," says Haney.

LEADING FROM THE FRONT It is early days for the Lean Academy but Haney has already seen his first student 'graduate' as a Lean Yellow Belt (see: Yellow Belt, Green Light on page 8). Meggitt's Chief Executive, Stephen Young, completed the course in May and Haney, newly arrived, could hardly have been more surprised or pleased to be asked to lead the training: "It was a phenomenal experience for me. I was already so excited by the MPS but that excitement reached a new level when I realised that pretty much my first assignment would be to take Meggitt's Chief Executive through the Yellow Belt curriculum. Normally it is nearly impossible for someone in Stephen's position to take three full days out. But he even managed to make the time to complete day three almost immediately. I don't know that there are too many Chief Executives out there who would consider doing that. It is truly leading by example and deserves a lot of respect."

Each Green, Black and Master practitioner will also be expected to use their new skills to make a defined, fully-audited contribution to Meggitt's bottom line

Young's endorsement of his Yellow Belt experience has been enthusiastic, giving the embryonic academy instant credibility. "Who could ask for better word-of-mouth than from the Chief Executive himself," enthuses Haney. "We are already getting lots of 'pull' from executives across the organisation. (Pull is a Lean term for when increases in supply are based on real-time increases in actual demand.) A big part of my job is to create momentum for the MPS; the more people at the higher levels in the organisation who embrace the MPS, the more momentum we will have. We are doing something right if the good things are so contagious that others really want to get involved. The response to Stephen's Yellow Belt experience is a clear sign that people are already coming to understand the MPS, the vision, the journey, and that they are keen to get on board." ●

Meggitt lands multi-million dollar fuel system award from Sikorsky

Meggitt has won a long-term contract award for the Sikorsky S-92® helicopter sponson fuel system. The contract starts now and will extend through 2030, with deliveries starting in 2015.

The proven and technologically-advanced S-92® helicopter is certified to the most stringent safety requirements of the Federal Aviation Administration (FAA).

The aircraft's sponson fuel system, which contains a structural composite housing, a fuel cell and complete fuel integration system, derives from Meggitt's long experience in composites and fuel containment. The new design of the multi-piece composite structure reduces manufacturing risk and the cost of field repairs.

Meggitt Chief Executive Stephen Young commented: "Meggitt has long been expert in flexible fuel cell design, recently launching an IED-resistant design for land vehicles.

"This programme award, which encompasses our first, fully-certified fuel containment system, marks an aggressive entry into the upper level fuel assembly market, consistent with the strategic objectives of our Polymers & Composites division."

The sponson fuel system will be produced in the division's state-of-the-art facility in Rockmart, GA, USA.


GOOD
VIBRATION

Five years since Meggitt acquired one of its suppliers, Ferroperm Piezoceramics, the boutique Danish supplier of piezoceramic components, has proved the perfect microcosm of the Meggitt ethos. We ask its managing director, Torsten Bove, about the secrets of its success.

The Scandinavians are famous for their minimalist, pared-back design, all clean lines, clarity and simple functionality. Small wonder, then, that the Danish element of Meggitt Sensing Systems—formerly Ferroperm Piezoceramics—should be a small-scale enterprise that runs along smoothly efficient lines. What might come as more of a surprise is the extent to which this pint-sized facility combines the triple business goals of profit, excellence and virtue.

With its consistent, steady growth, flawless products and participation in ground-breaking medical developments, Meggitt Sensing Systems, Denmark has been making its mark upon the world and amply justifying its place in the Meggitt family. If that weren't enough, far from showing signs of slowing down it is about to move into a new base from which to continue its rise.

When Ferroperm's managing director, Torsten Bove, talked to the Meggitt Review five years ago, he was aiming for the skies. The company's core business was—and remains—ceramic components, designed to be used in sensors to test pressure and vibration in aero engines and industrial gas turbines. What made these products stand out from those of their competitors was the heat they could withstand.

Back then, the components being produced were able to withstand an impressive 550°C, but Bove was aiming higher. He had his sights set on 900°C, hot enough for the sensor to be placed close to an industrial gas turbine or an aero-engine hot section.

The problem was getting the balance right between stability and temperature. Ferroperm had always used artificially created ceramics rather than natural crystals as they performed more consistently, but this meant a compromise in terms of temperature.

"Naturally occurring crystals are extremely stable up to very high temperatures," says Bove. "It is only now that we have been able to make artificial ceramic materials that offer the same stability over this temperature."

Five years on, they have finally cracked the formula and achieved the elusive 900°C target

Five years on, they have finally cracked the formula and achieved the elusive 900°C target.

"They're good materials," says Bove, with typical understatement.

All that remains is to create housing and electronics that can match the temperature of the components—a challenge that Bove describes as "not a trivial task".

For now, these high temperature grades are exclusively used within Meggitt. The Danish facility has established itself as sole supplier of ceramic components to both the Swiss and Maryland branches of Meggitt Sensing Systems and these contracts make up about 10% of its overall business.

Less glamorous, perhaps, but equally

S
MA
RTE
NGIN
EERIN
GFOREX
TREMEEN
VIRONMENTS

Above: Offshore and underwater sonar systems make up a third of Meggitt Sensing Systems, Denmark's total sales.

Above left: Today 'high intensity focused ultrasound' (HIFU) is being put to more sophisticated clinical uses including non-invasive cancer treatments and glaucoma treatment.

Left: Diagnostic devices for pregnancy scanning are relatively low-tech applications of the company's products.

important, is the steady growth of its supplies to the sonar business for off-shore and underwater acoustic systems.
Bove explains how the technology works. "From our ceramic material you generate a vibration called an ultrasonic signal. It gets transmitted into water and there's a reflection coming back from the seabed.

uses, with the development of a much more focused ultrasound known as high intensity focused ultrasound, or HIFU.

"This is where things are happening for us at the moment," says Bove. "This is where the hyper-growth is coming from and where we'll see a lot more new applications in the future."

If underwater sonar systems make up the firm's bread and butter, the medical applications of their products are the icing on the cake, combining increasing growth with truly exciting developments with potential to change and even save lives

The same ceramic that sends the signal will then receive the echo as well, and depending on how long a time the signal has been from sending to receiving it back, that will then give a measurement of the distance."

This technology has a huge variety of applications and is especially useful in deep water where light cannot penetrate. Acoustics are used instead to take measurements and create detailed pictures of the sea bed. An oil well will have a transmitter on the bottom of the sea sending essential information to the platform on the surface.

It has proved invaluable in the fishing industry, too, which according to Bove has become increasingly high tech.

"The industrial fishing fleet has a very advanced sonar system on board, so you can direct your ultrasonic beam to look out to see if you can find a school of fish," he says. "Then you can focus the beam on the school of fish that will give the fisherman an estimation of what type of fish he's looking at and then whether or not that school of fish is worth going after and trying to catch."

If underwater sonar systems make up the firm's bread and butter (it accounts for about a third of its total sales), the medical applications of its products are the icing on the cake, combining increasing growth with truly exciting developments with potential to change and even save lives.

For years their components have been used in what Bove describes as "low tech diagnostic devices", such as scanners used in pregnancy to monitor the foetus. In the last five to eight years, the components have been put to ever more sophisticated

The technology is beguilingly simple. "The principle," explains Bove, "is that you can focus ultrasound into a point and at that point you have a very high energy density which heats the tissue in that little focal point."

The applications of this technology are, it seems, endless. One of the most exciting uses for the technology is in the treatment of cancer. In simple terms, it involves the focused application of heat to a tumour, typically in the brain, liver or kidney where it is difficult to operate. Young cells are less resistant to heat than older ones. Since a growing cancer tumour contains a large number of young cells, it is those cancerous cells that will be destroyed when the area is subjected to heat.

Obviously we do like profit and we do like sales—that's all very nice—but we are about treatment, we are about extreme environments

"You get a non-invasive and very focused treatment of the cancer in cases where you can't operate," says Bove.

Meggitt will not, he says, make its fortune from this development, despite it having been approved by the US Food & Drugs Administration and gained CE approval. "From a commercial point of

SPEED READ

Good vibrations

Hot property
The Danish element of Meggitt Sensing Systems produces piezoceramic components for use in sensors to test pressure and vibration in aero engines and industrial gas turbines. In the last five years they have been refined to withstand temperatures of 900°C and make up 10% of the facility's business.

Good acoustics
Ceramic materials produced by Meggitt are used in deep water to transmit an ultrasonic signal, measuring distance and creating a picture of the sea bed. They are used by off-shore installations and, increasingly, by the fishing industry to locate shoals and identify fish.

Focus on medicine
High intensity focused ultrasound—HIFU—is one of the fastest growing applications of Meggitt's piezoceramic components. By focusing ultrasound into a point, it generates heat that is used to destroy cancer cells, blast fat, reduce wrinkles and stop glaucoma. Meggitt's track record in the vibration sector has placed it at the front of the field.

Best of both worlds
To accommodate the growth in its business, the Danish facility is moving to a new, purpose-built site. Even at its new site, and under the Meggitt umbrella, it aims to retain its small business ethos whilst enjoying the benefits of being part of a large organisation.

One to watch
The future is bright in Denmark. It has developed an energy harvesting component for a turbine manufacturer that may find a home in the aerospace market, and its HIFU components are being used in medical research that could treat conditions such as hyperhidrosis and hypertension.

Production manager, Knud Johansen and operator, Klaus Andersen discuss the production of High Intensity Focused Ultrasound (HIFU) elements. Very tight tolerances are critical to the accurate focal points needed for the new medical treatment methods.

view it's not so exciting," he says. "It's not enough to generate a significant sale".

What it lacks in commercial potential, though, it makes up for in feel-good factor, as Bove readily acknowledges. "It's a very good story to have for us. It's a very nice application and we feel very good about doing all these good things for cancer treatment."

We feel very good about doing all these good things for cancer treatment

More exciting from a purely commercial point of view is the supply of components for cosmetic fat-busting, designed to replace the more brutal procedures involved in liposuction. Using HIFU, fat cells are destroyed from the outside and removed naturally by the body's immune system, without having to be suctioned out.

The treatment is aimed at those seeking spot treatment of problem areas rather than the wholesale removal of large areas of fat. "It's dealing with those people who just want to get back into their old business suit or evening gown and get rid of the love handles," says Bove. "A one-hour treatment will give you one shirt size or trouser size, for about $2000 per treatment."

The treatment is already proving popular. It is on the market in both the US and the European Union and is expanding into Asia.

Equally promising in commercial terms is the use of HIFU in cosmetic skin treatments. Here, the ultrasound beam is directed at the under-skin or epidermis, creating small local lesions that bring collagen and vitamins to the area. As the lesions heal there is a tightening effect, reducing wrinkles and producing a healthy "glow".

The Danish facility supplies both ceramic components and an imaging element based on the thick-film technology produced by its partner business, InSensor.

"The latter," explains Bove, "is a technology that we developed as a part of funded programmes with the European Union and the French government. We make small imaging elements—a very

The story so far

Six years ago Ferroperm Piezoceramics was a valued supplier of piezoceramic components to Meggitt Sensing Systems in Switzerland and Maryland. A niche company numbering only around 60 employees, it was proud of its small scale, which it believed to be the secret to its quality, consistency and bold R&D.

So how did a niche enterprise like this end up being part of a multinational corporation? Well, keen to harness Ferroperm's talent and potential, Meggitt was eager to acquire the company. The attraction proved mutual—Meggitt offered the benefits of international profile and financial muscle as well as promising a steady supply of orders.

The acquisition took place in 2008 and the relationship has flourished. Since then the Danish enterprise has become the sole supplier of ceramic components to both the Swiss and Maryland facilities and has grown rapidly in external markets as well as continuing its cutting edge research into emerging technologies and participating in life-changing medical breakthroughs.

The whole selling point is that we've had all the time is the batch-to-batch stability, when they get a component from us today and in ten years' time it will measure exactly the same on all key parameters

simplified picture that you can generate from a sensor imaging chip.

"[The imaging element] is a critical element for patient safety, and we are the only company that so far can supply this at a price that fits the disposable model."

The potential for this technology is enormous, Bove believes, and has seen an astonishing rate of growth. "In the last year there's been a 50% growth and there's a 50% growth in 2013 as well, and over time there are projected a sustainable 20% growth."

For all the dramatic projections, though, what really excites Bove is the use of HIFU in treating glaucoma—a hitherto incurable eye disease that affects 60 million people around the world.

"This is what we really like in Meggitt," he says. "Obviously we do like profit and we do like sales—that's all very nice—but we are about treatment, we are about extreme environments. Glaucoma is a disease that affects many millions of people and our customer has developed a tool that actually stops glaucoma in a few minutes of treatment, which is a fantastic development. So this is much more a core Meggitt business."

What makes the treatment so exciting is the extent to which it improves upon traditional treatments for glaucoma which involve a progression from eye drops to painful surgery. Not only are these inefficient and prone to causing inflammation, but, critically, none of them treats the root cause of the disease - pressure in the inner eye that causes damage to the optic nerve. With HIFU, by contrast, ultrasound is applied to the cells that produce the liquid causing the pressure.

"Basically they turn down the tap," says Bove. "Within hours after a two-minute procedure the eye pressure drops to within the normal range and the glaucoma is stopped. It's not a cure in the sense that you will not regain any of the vision that you've lost over the years, but the operation will stop any further development of the eye disease."

It's still early days. At the moment it is only being used by a small number of ophthalmologists in France, whilst American FDA approval is sought, but the potential is clear to see.

"It's going to be huge," says Bove. "It's a fantastic treatment and it's a fantastic device and the market is definitely there."

With such enormous potential, one might expect competitors to be jostling for position. In fact, Bove seems fairly relaxed about his firm's status in the HIFU market.

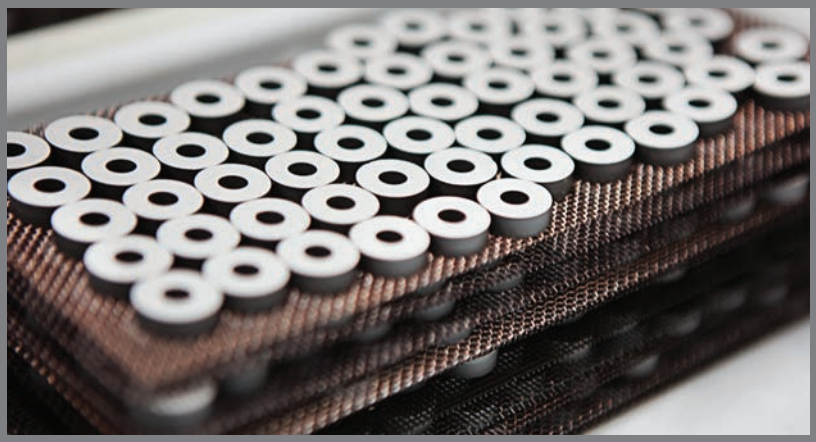
"The market for piezoceramics is very segmented—each of our competitors has different fields of interest," he explains. "Some of our competitors have been very focused on the sonar business where you typically have to make a lot of material and a lot of big parts, which makes it very difficult to keep the quality level at its best. In the European side, the competitors are in some cases very oriented towards the automotive industry, and that also gives a regime of high volume and very low price."

When it came to making its mark in the medical field, with its requirements for tiny components and absolute precision and consistency, Ferroperm's track record in the vibration sector, supplying

What are piezoceramics?

Piezoelectricity is an electric charge that accumulates in certain solid materials (including ceramics and crystals) when mechanical pressure is applied. The structure produces a voltage proportional to the pressure. Conversely if an electric field is applied, the structure changes shape.

The piezoceramic components created by the Danish facility are used in vibration sensors, underwater acoustics and medical and cosmetic treatments. The possible applications are expanding all the time and this facility is definitely one to watch.



High-volume production for medical and sonar applications requires both special high-tech automation and simpler approaches. Around 1,000 high-power sonars (above) are produced per year, while the medical focusing elements (below) will exceed that in 2014.

accelerometers that require precise batch-to-batch consistency, has given it the edge right from the start.

"The whole selling point is that we've had all the time is the batch-to-batch stability, when they get a component from us today and in ten years' time it will measure exactly the same on all key parameters. It means that the electronics driving the ultrasound can be the same, so they don't have to do manual calibrations and adjustments."

With all these new markets and possibilities, the facility has been bursting at the seams and has even had to install containers in the car park to keep things running smoothly. Unsurprisingly, Bove has an answer to this challenge, too.

"We filled the existing site to the brim and a little bit more, so we're now moving, which is a major step for us. We have signed the lease on a new factory, which is more than twice the size of that we have today and we are moving by 2014."

The new factory is just a mile up the road from the existing one, a factor which is important to Bove as he is adamant that the move should not cost Meggitt any of the existing employees. There may not be many of them—even now there are only 70—but Bove insisted that the new site should be close enough to keep them all.

The new premises will have other advantages. Everything will be under one roof and will be designed according to the company's precise requirements.
For all this expansion, though, Bove insists that the firm is still a small-scale enterprise.

"I'm proud of this," he says. "We are still fairly small. It's a competitive advantage for us to behave like a small or medium-sized company—we have a need to show flexibility and agility within the market. It's a market that's driven by delivery time and flexibility and innovation."

Nevertheless, he acknowledges that the financial muscle of Meggitt has been invaluable.

"We try to use the best of both worlds," he says. "We try to act like a small company and then leverage the financial ability, the programmes, all that we have in terms of trade compliance and ethics and health and safety and so on, to the extent that we can. So we try to act like we have that full back office available if we need it, but not unless we need it. And it has been very good for us.

"I'm often asked if it wouldn't have been better just to not sell to Meggitt and take a nice profit from these medical procedures alone, but we wouldn't have won the cases, we couldn't have been seen as a serious and stable partner. We wouldn't have gained the business and we wouldn't have been able to expand unless we had the muscle."

Once installed in the brand new, purpose-built facility, all eyes will be on the firm's future.

One area to watch is the facility's expansion into energy harvesting. The company makes a hermetically-sealed, self-contained component that looks like an ice hockey puck. It measures temperature and vibration levels in a wind turbine, industrial machine or aircraft, sending them at wirelessly to a base station at regular intervals. With prototypes developed for Vestas, the biggest turbine manufacturer in the world, Bove is hopeful that it will eventually sell to other customers, mainly in the aerospace sector.

"It's an amazing little product," says Bove. "You basically just place this little sensor node and then you forget about it until you have a problem, when it will give an alarm on the computer screen."

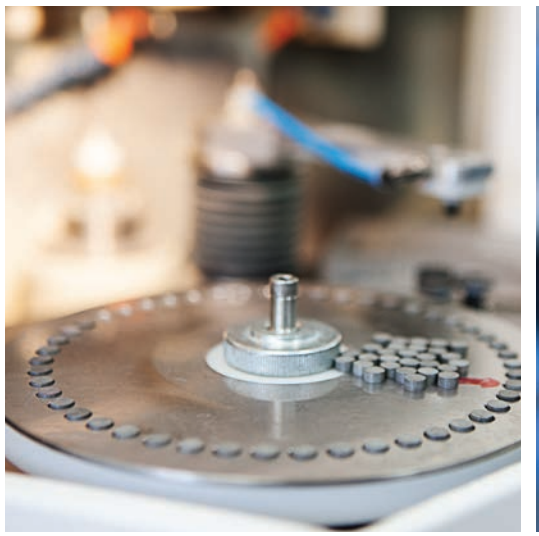
Where Bove really sees the company's expansion in the next five years, though, is in the medical and cosmetic fields. He expects to see developments in a new treatment of hyperhidrosis—excessive sweating—whereby ultrasound is used to burn off sweat glands in place of the current, and painful, surgical treatment of the condition.

He is also cautiously excited about a possible treatment for hypertension, or high blood pressure.

"The discovery of this was made more or less by accident," Bove explains.

It was found that kidney transplant patients with high blood pressure typically would see an unexplainable and permanent decrease in their blood pressure without any need for medication. This was eventually tracked down to special nerve

High intensity focused ultrasound, or HIFU, is where things are happening for us at the moment. This is where the hyper-growth is coming from

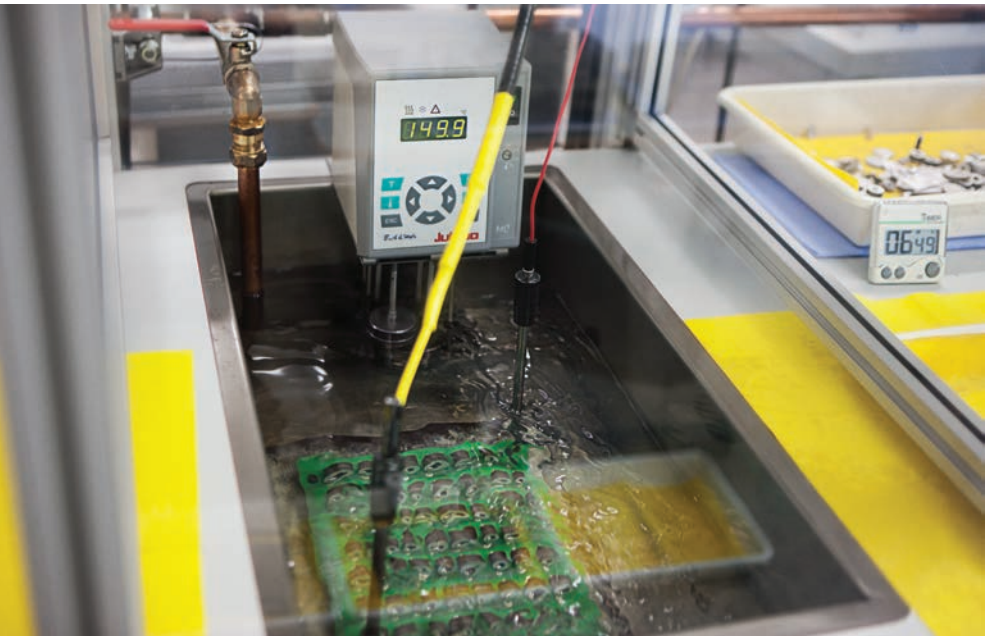


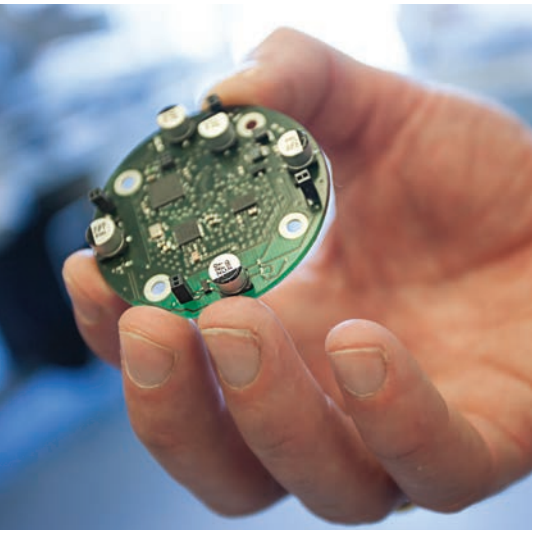
cells on the kidney, and it has since been proved that lesions on these cells can produce the same effect.

"The hunt is therefore on for a method to do this with non-invasive or minimally-invasive methods," says Bove. "Since we are very good at focused high power ultrasound and manufacturing very small parts, we obviously have this in our scope." Bove stresses that there are no specific commercial customers for this technology, but many of his customers are involved in researching the idea. He describes it as "a lottery ticket", but one suspects that he has a good idea what the winning numbers might be.

"We just have to keep on and have the capacity and have the focus on the customers and keep supplying them with good new products," he adds.

With that strategy in place and the facility's track record, it sounds as though the right lottery numbers will be coming up again and again. •





Centre, top: The R&D group has played a very active part in developing the high temperature materials now being commercialised. Left to right: Dr Natalie Gerds, R&D engineer; Torsten Bove, Managing Director; Dr Konstantin Astaviev, Programme Manager; Dr Tomasz Zawada, R&D Manager; Rasmus Lou-Møller, InSensor department manager

Middle left: High Intensity Focused Ultrasound elements are ground to the required shape using fully automated, highly accurate machines.

Middle right: The piezoelectric effect is created through the polarisation process. Controlling temperature, electric fields and time are critical to reproducible production.

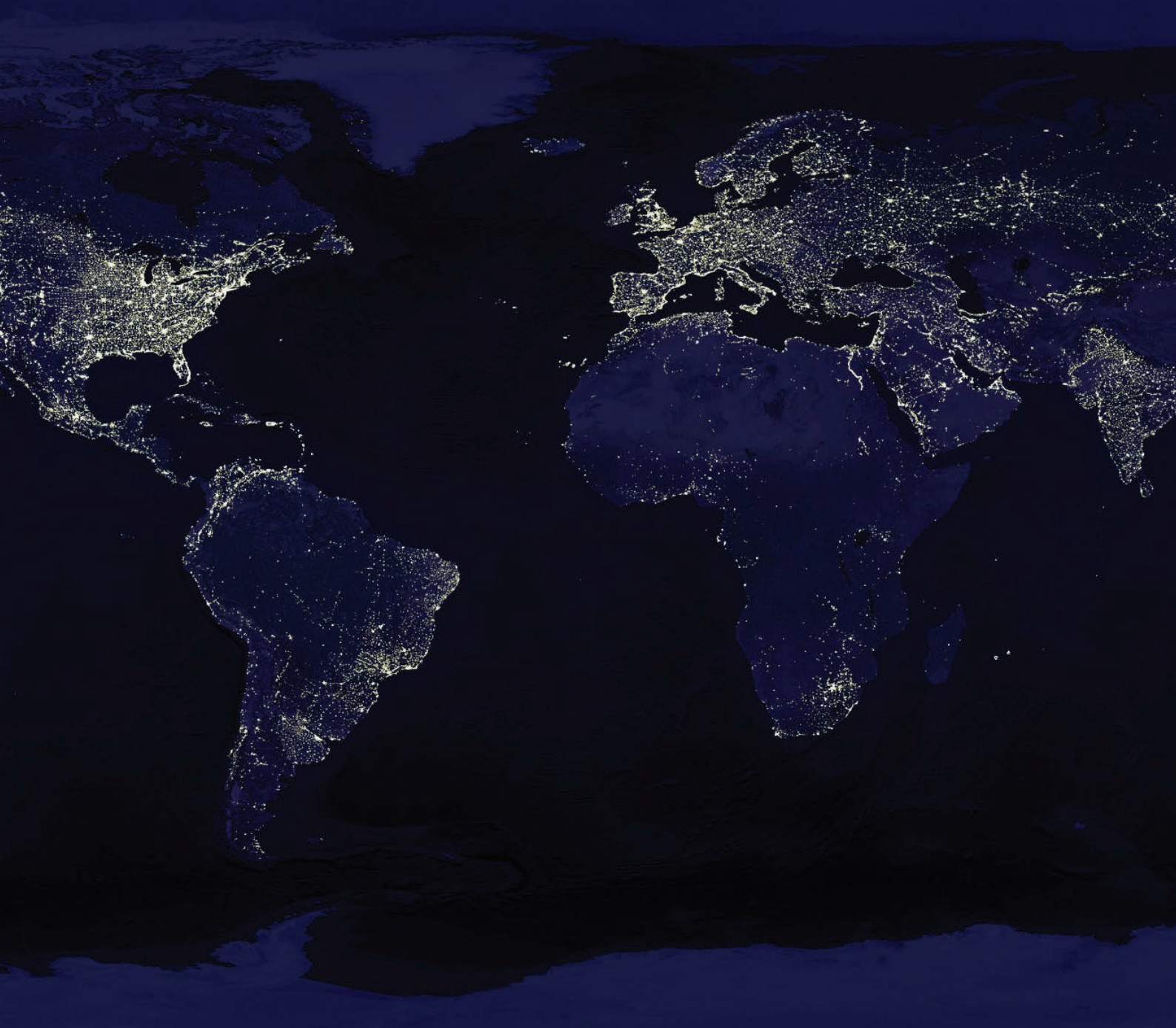
Bottom left: Automated equipment for grinding High Intensity Focused Ultrasound elements. The machines for this critical process are running almost constantly to keep up with increasing demand.

Bottom centre: Piezoelectric energy harvesting device. The node provides battery-free vibration and temperature measurement, signal conditioning and wireless transmission to a remote base-station. The product was developed for wind turbine producer, Vesta but have a future on other Meggitt Sensing System aerospace and energy platforms.

Bottom right: Operator Sabri Bozkir applies electrode layers to a ceramic surface. These provide the electrical interconnection between the electronic system and the piezoceramic material.

What is power without control?

Jet aircraft engines may still be able to capture the popular imagination but it's industrial gas turbines here on the ground, the workhorses of energy supply, that keep the lights on all over the world. And it is very often Meggitt technology that provides the fine and consistent control they need to perform at peak efficiency, day-in day-out.



Designing and precision-engineering highly responsive and reliable industrial gas turbine (IGT) controls, Meggitt occupies an inconspicuous but vital niche in global power generation. Industrial gas turbines generate about a quarter of the world's electricity, with the proportion growing steadily. As giant pumps they maintain the 300psi working pressure inside natural gas distribution networks. When an IGT fails there's almost always a lot at stake, says Paul Normand, Meggitt Control Systems' energy sales and marketing director: "If a Los Angeles generator drops a turbine in the middle of a hot summer's day, with every aircon unit in every factory, hospital and office block running at full throttle, someone has got to replace that 50 or so megawatts in minutes. Meanwhile, the operator is losing $150,000 an hour while that turbine is idle."

In vast countries like India and China, where new gas distribution backbones are just bedding in, a compressor failure can mean power cuts for hundreds of millions of people: "Large parts of these new networks are in remote, inhospitable locations where poor infrastructure and extreme weather make them vulnerable to repair and maintenance delays. A relatively straightforward problem—like a lightning strike on a poorly-earthed controller—might take days, if not weeks, to fix," explains Normand.

Then there's the IGTs that power energy production platforms, often moored in deep water hundreds of miles offshore. The pressure inside one of these wells is enormous. It might have the weight of a Gulf of Mexico pressing down on it, so it can't just be turned off temporarily, it can only be permanently capped with concrete: "If an offshore turbine fails, and the gas can't be used to produce power or processed for distribution, then it has to be flared. A gas platform running on part-power is a very ugly scenario. They might as well be burning dollar bills."

Hotter and harder

So for IGT operators no less than for airlines, ultra-high reliability is the number one priority. "Customers know these systems are derived from our own aerospace technology, so they expect them to be tough, light, precise and reliable," says Normand, who spent 25 years in aerospace before taking the sideways step into energy. "But in fact the duty cycle of an IGT is so much harder. Aircraft take off at 110% for a few minutes, then it's mostly cruising on part power. A gas line compressor operates at full load for months at a time, like an aircraft engine permanently on take-off. When we took a high quality valve off an RB 211 aero-engine and tried it on a Trent IGT, it just burned it up."

Nor is the relatively cossetted life of an aero-engine replicated on the ground. IGTs often have to run on relatively dirty fuels and shrug off some of the planet's

> If a generator drops a turbine, the operator is losing $150,000 an hour while that turbine is idle

Above: Meggitt Control Systems Quality Inspector, Chito Baltazar and Paul Normand, Energy Sales & Marketing Director inspect the control valves that provide critical reliability for power plants often situated in remote locations with poor infrastructure.

Above: Meggitt's industrial gas valves are based on aircraft technology but the performance requirements differ. Aircraft take off at 110% for a few minutes, then mostly cruise on part power. A gas line compressor operates at full load for months at a time, like an aircraft engine permanently on take-off.

All for one

All Meggitt's IGT control technologies come together in this flagship product—the integrated fuel metering skid. Newly-built industrial gas turbines are tested extensively by the manufacturers before being shipped. Then they must be removed from service periodically and sent to OEM-accredited technical centres for overhaul or repair and retest. A turbine test cell needs to be able to replicate many different control infrastructures to accommodate and test-run a wide range of turbine models. A movable fuelling 'skid' makes this possible by creating a compact, manoeuvrable, self-contained system that can be wheeled into position alongside the turbine to provide it with the fuelling it needs to be put through its paces in a safe, precisely-controlled manner.

The most recently delivered test-cell fuel 'skid' is the single largest fuel system Meggitt has ever built. Weighing in at just over a tonne, its complex array of valves and controllers —including six separate fuel delivery valves—can accommodate every General Electric LM model, including the latest LM2500+ G4 with its five separate combustor manifolds. It can also be readily customised to suit a number of other customer applications.

Our total engineering resource is substantial and we can draw engineers from the aerospace side if we need extra muscle. Most of us came from over there in the first place

most challenging operating conditions: the heat and dust of a Saudi desert oilfield or the deep cold of Canada's Arctic gas fields. Even so, the major IGT makers—including General Electric, Rolls-Royce, Siemens and Kawasaki and IHI in Japan—know they can rely on a Meggitt valve for 50,000 hours or more of trouble-free service. "That's six continuous years," notes Normand with pride.

Bleeding edge

Precision-engineered entirely from stainless steel and other corrosion-resistant materials, all Meggitt valves are in effect maintenance-free in normal service. Collectively, they have more than 100 million field operating hours (more than 11,000 years) to their credit. Many's the customer astonished to see their ten-year-old valve looking almost as fresh as the day it was installed. But there's much more to high levels of reliability and resilience than exotic materials alone. It is clever fundamental design and 25 years of continuous development that has kept Meggitt's IGT controls at the leading edge.

"In the mid-90s we designed an all-new, sleeve-style, hot bleed air purge valve for GE. It caused a sensation then, but the technical leap we'd made was so large that it remains the performance benchmark today," says Normand. Bleed air is used to power important ancillary IGT processes like combustor fuel purging. Industrial gas turbines are often 'dual fuel', running on diesel as well as natural gas. Switching back to gas, high pressure hot bleed air from the turbine's compressor must be used to purge the combustor of residual diesel which would otherwise 'coke up' the fuel delivery tubes and nozzles. The whole process is controlled by a valve which must itself survive temperatures as high as 1100°F (600°C) and overcome working pressures of 500psi. "In 1995 a typical purge valve weighed 500 lbs and you needed

a crane to service it," continues Normand, "but getting a crane into an engine bay isn't easy. Our new valve was better in every way but it weighed just 80lbs. A single installer could carry it in his arms. It's a fact that the simpler you make maintenance, the more customers love your product – and this valve made life so much easier for them. Nobody wants to have to dismantle an engine just to change a valve."

A sculpted, four-pillar design reduces the sheer volume of metal, cutting costs too since most of the weight saved is expensive stainless steel. But it's what goes on inside the valve that is the clever part: "Careful balancing of the internal pressure forces enabled us to minimise the effort needed to activate the valve. Without this load-balancing the actuator would have to work against the full 3000 lbs of pressure force inside the pipe. With our design it's reduced to just 100 lbs, enabling us to use much smaller actuators and to make the valve body much lighter. Many competitors are still building massive valves, with enormous hydraulic or pneumatic actuators several times bigger than the valve itself, because they have to overcome all that internal pressure with nothing more than brute force. Our aerospace experience told us there was a much better way."

Light speed

Meggitt's other main IGT valves fall into two main types, fuel metering and fuel shut-off. Both use similar technology to achieve their own high levels of performance.

Fuel metering valves are a turbine's throttle control. Power is generated from the expansion of gases when fuel and air are burnt together. The fuel and air mass flow determines how fast the turbine spins and how much power it makes, so the accuracy and consistency of this valve is vital to the turbine's efficiency and reliability. Fuel shut-off valves, on the other hand, are the crisis kill-switch. Deployed in pairs, to provide dual-redundancy, they are frequently all that stands between a turbine operator and an eye-watering repair bill.

Both operations—metering and shut-off—demand great speed and accuracy from the systems that control them. "The smaller actuating forces created by load-balancing also mean we can use much lighter moving parts, reducing inertia and greatly accelerating operating speeds," says Normand. "Our electric fuel metering valves offer greatly improved performance over the hydraulic equivalent and have exceptional flow and positional accuracy, all of which helps improve fuel efficiency and reduce emissions. Today's dry low emissions (DLE) technology require very fast-acting and repeatable controls. Our all-electric valves and actuators are the only effective solution. A globe-style fuel metering valve was our first application of the high-speed brushless servo motor technology we now offer on all our gas turbine controls. It was originally developed for Rolls-Royce, and three of them, all digitally-controlled and electrically-actuated, are used on every RB211 and Trent DLE turbine."

Meggitt's high temperature, poppet-type fuel shut-off valves are also super-fast. They need to be. "Their job is to make sure that if a 'throttle' sticks open the turbine doesn't spin out of control, resulting in a multi-million dollar repair bill to the shaft and blades," explains Normand. "A turbine operating normally will already be running at up to 12,000 rpm, so things happen very fast when something goes wrong. If an overspeed problem is detected, these valves are designed to close completely in 100 milliseconds, less than half the blink of an eye."

Shock of the new

The story of Meggitt industrial turbine controls is one of continuous research-driven development and innovation. Nowhere is this more evident than in the field of 'more electric'. Customers can specify any Meggitt valve with either electric, pneumatic or hydraulic actuation. Hydraulic was for a very long time the industry norm in IGT control, but Meggitt Control Systems pioneered electric actuation in the early 1990s—using load-balanced designs to unlock its potential—and today it is by far the most dynamic product line. Aero-derivative engines have been using Meggitt electrically actuated controls for 20 years. Now the enduring popularity of hydraulic in the heavy-frame market has begun to wane as the cost-of-ownership argument carries the day here too. "Major manufacturers are starting to push hard to electrify their new large frame engines," says Normand, "and retrofitting electric controls is also

> Fuel shut-off valves are the crisis kill-switch, often all that stands between a turbine operator and an eye-watering repair bill

SPEED READ
IGT valves

Mission critical
Industrial gas turbines (IGT) generate a quarter of the world's electricity and pressurise the world's gas supplies. A turbine failure means power cuts for homes and businesses and million dollar losses for the operator. Ultra-high reliability is the number one priority.

Market leading
Meggitt's precision-engineered fuel metering, fail-safe shut-off and hot air purge valves are among the world's most reliable, precise and fast-acting. Made entirely from corrosion-resistant materials they are, in effect, maintenance-free, capable of more than 50,000 hours of trouble-free service. Collectively they have clocked up more than 100 million field operating hours.

Pioneering
Meggitt pioneered fast, clean, reliable electric actuation in IGT controls. Clever engineering design unlocked the technology, reducing activation effort 30-fold to create valves six times lighter and three times faster.

Customer driven
Meggitt maintains a vast catalogue. Component standardisation keeps most urgently needed spares available off the shelf. But the industrial control valves team has never stopped thinking of itself as a custom design house committed to close collaboration with customers.

partner

Two-inch electric gas fuel metering valve: Main gas fuel control for the RR RB-211 and Trent engines

Two-inch electric gas fuel metering valve: Main gas fuel control valve for GE LM2500 and LM6000 DLE engines

One-inch gas staging valve: Turns gas fuel on and off of the various engine burner stages

growing in popularity in spite of the cost and complexity of reprogramming engine controls. A typical hydraulic control installation costs millions of dollars to build, fills a small room and the pipes and pumps need plenty of maintenance. Electric is faster, cleaner, more reliable and lower maintenance, and you sure can buy a lot of it for that kind of money."

Over the last five years Normand and his colleagues have worked closely with Californian utility Midway Sunset, replacing all the hydraulics on its heavy frame turbines with customised, high performance electric valves and controllers. "We just dearly love our Meggitt [formerly Whittaker Controls] valves," says Midway Sunset instrumentation technician Doug Schmidt. "We're just crazy about the electric valve operation. Getting rid of the hydraulic oil is the main thing. The maintenance of the electric valve takes about one third of the time over hydraulic. The main advantages we see are you don't have the hydraulic oil, there is no varnishing, no leakage, the calibration is much easier and quicker and there are greatly reduced maintenance issues and labour."

Partners

Today, Meggitt maintains a large catalogue of industrial control valves and system, and its customer-focused policy of promoting component standardisation means there is always the best possible chance that the spare part a customer needs urgently is available off the shelf. Even so, the industrial control valves team has never stopped thinking of itself as a custom design house and therein lies the key to its continued success says Normand: "Our catalogue size has doubled in five years but there are so many variables in an IGT control installation that there's still some customisation in half our contracts. It might be a customer's unique way of connecting things, an unusual combination of equipment, pressures and temperatures might need to be different, or quite often the off-the-shelf valve sizes are not quite right so we have to build a bigger or smaller one. This is an industry in which the way you work with your customers can still be an important criteria."

> Many's the customer astonished to see their ten-year-old valve looking almost as fresh as the day it was installed

This commitment to design, customisation and close collaboration is perhaps the greatest strength of the business, says Normand: "We don't just sell products. We sell interactive partnerships. There's always lots of close contact and team working with the customer so we can really get to understand their problems and the things they are trying to achieve. This isn't common in our market. Lots of companies don't like changing a product to meet a customer's needs more closely. They think it takes too much expensive engineering effort. But this approach is in our DNA. We started making IGT control systems precisely because we could see that most off-the-shelf valves didn't come close enough to matching the customer need."

Normand can name several customers who first came to Meggitt's door because they'd got themselves into deep water with an off-the-shelf, brute-force valve from another supplier which couldn't deliver the performance they needed: "We worked closely together, replacing those big, clunky, old-tech valves with our customised high performance ones and the problem was solved. Customers love to see the hands-on dedicated engineering support we have here. It gives them real confidence and a sense of security. Our total engineering resource is substantial and we can draw engineers from the aerospace side if we need extra muscle. Most of us came from over there in the first place."

This partnership approach is essential to the longevity and growth of the business, says Normand. "It's so clearly what the customer wants. They are looking for a partner who will work closely with them to reduce their costs and help them make more reliable, lower-cost engines that are more competitive in their marketplace. And that partner is us." •

iRoom

The future shape of collaboration

Meggitt Avionics' new approach to problem solving is encouraging staff to think on their feet.

Q: WHEN IS A CONFERENCE ROOM NOT A CONFERENCE ROOM?

A: WHEN IT'S AN INTERACTIVE PROBLEM-SOLVING ENVIRONMENT.

Yes, yes, we know. It sounds like the type of business-speak that makes mild-mannered citizens want to string up the perpetrator from the nearest available chandelier. In this case, however, the latter description is quite accurate.

The Meggitt Avionics iRoom (the 'i' stands for 'interactive') at Fareham was inaugurated in 2011 after it was realised that the existing conference room was proving inadequate in encouraging collaborative development on projects, particularly with colleagues at the HCL Meggitt Development Centre (HMDC) in Bangalore, India.

Previously, the room was set up with standard teleconferencing equipment, with cameras focused on people sitting around a table.

"It became pretty self-evident that the existing methods of communication weren't enabling us to have efficient communication and knowledge-sharing," says engineering capability manager Jerome Evans.

"For myself, I don't like having meeting rooms that are set up just for meetings and chatting. Having comfy chairs around a table aren't the right tools for a lot of the problems we come to work to solve."

The solution was provided—indirectly—by Evans' three young children, Poppy, Oly and Will. While visiting their school, he saw their classrooms' smartboards.

"A smartboard is effectively a very large whiteboard, but it's a PC screen as well. So basically imagine your PC screen stretched to 90 by 60 inches and with the ability for you to write on it in the same way as a normal whiteboard.

As the iRoom at Fareham is linked electronically to a similar facility in Bangalore, writing on the board in one location is instantly duplicated more than 4000 miles away

"You can save what you've written on it and do lots of manipulation of the data," explains Evans. As the iRoom at Fareham is linked electronically to a similar facility in Bangalore, writing on the board in one location is instantly duplicated more than 4000 miles away.

Much of what can now be done on a smartboard would once have been done on paper technical drawings. "You traditionally have a print-out, get a red pen, cross things out, or circle them, pdf it, and give it back to someone with an instruction to make the changes," says Evans. There's just one problem: "When you do that there's no increase in knowledge—the recipient is just being told what to do.

A whiteboard with two people standing in front of it is a problem-solving zone

"My view is that you put the drawing up on the smartboard and use the opportunity to share your knowledge by saying, for example: 'The reason I'm doing this is x, y and z,' so there's a knowledge, coaching and sharing opportunity."

The room also contains a large, high-resolution LCD screen for illustrating fine technical detail, with everything covered by wide-angle cameras.

However, the equipment is merely an enabler, says Evans. "The real element is the behavioural change associated with working in that environment. We immerse ourselves in a problem and get out as quickly as possible."

Which brings us back to those comfy chairs Evans mentioned earlier. Or rather, the lack of them.

The room was initially commissioned with three small, chest-high tables of the sort that one might find in an Italian coffee bar—just enough space for meeting participants to place a laptop or papers on.

The lack of seats, rather than the high-tech equipment, caused the most comments (not all of them favourable) among initial users, says Evans, who relented and bought half a dozen inexpensive bar stools.

The fact that people do not sit in conventional chairs definitely changes the way they participate, he says. They tend to be more animated and active in conversations. "People standing in front of a whiteboard and articulating how they're going to approach a particular problem is quite a powerful tool. This room gives you the opportunity to communicate effectively and with greater clarity.

"A whiteboard with two people standing in front of it is a problem-solving zone."

Above: Smart people: in Meggitt Avionics' iRoom, an interactive space for real-time collaboration between global engineering teams: Steve Free, Deputy Engineering Director; Jerome Evans, iRoom architect and Engineering Capability Manager; and sponsor, Simon Riddiford, Programme & Engineering Director—all Meggitt Avionics.

It became pretty self-evident that the existing methods of communication weren't enabling us to have efficient communication and knowledge-sharing

Setting up the iRoom cost less than £20,000—a relatively modest sum and one that brought some immediate savings, such as the discontinuation of a £500-a-month ISDN line that had previously been installed in the former conference room. Overall, the room should have paid for itself in the first year of its existence.

Putting a monetary value on the improvements it has brought is less easy, he concedes. However: "What it has done is increase engagement between HMDC and ourselves. Importantly, it's changed our approach to a lot of our meetings and reviews. Meetings are generally faster."

Closer to home, too, the iRoom has had beneficial effects. "We're trying to get Meggitt working closer together. In Meggitt we've gone from a business of businesses that didn't talk to each other to an integrated group. We now have—in theory—one engineering team crossing boundaries."

His comments on increased ease of collaboration are echoed by Meggitt Avionics' programme and engineering director Simon Riddiford.

"We have so many conference calls that we have people working at cross-purposes. Conference calls are good for exchanging status reports but not for problem-solving. This is about providing information to people working remotely and solving those problems."

The iRoom "is all about presenting multi-faceted information in a way that stimulates people. With people standing up and moving around they get more animated and there's more adrenaline rushing around. If people are sitting at a table they tend to keep things to themselves."

Not everyone has taken to the new setting, concedes Evans. "Some individuals haven't embraced this way of working, but around 80% of people are quite willing to give something a try."

One party that *was* enthused was engineering directors from around the group, who visited the facility some months ago. "They all said: 'This is really good, we could use this.'"

Potentially, therefore, watch out for large screens and coffee bar tables being installed in a room near you. •

In Meggitt we've gone from a business of businesses that didn't talk to each other to an integrated group

Influence
is the new power

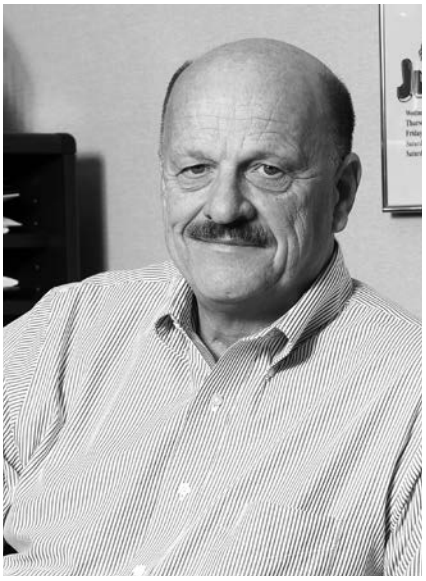
For the last few years Group Learning & Development has been growing Meggitt's first ever group-wide training offering. A range of programmes now exists to equip individuals, wherever they work, with the skills, tools and relationships to succeed in Meggitt's new, strategically-managed, global matrix structure. Prompted by the recent publication of the first group training directory, we spoke to Eric Ovlen and Sushma Hayes to hear how Group Learning & Development is helping to build One Meggitt, one person at a time.

The very model of a modern matrix manager: Sushma Hayes, Group Learning and Development Manager.

In 2010, Meggitt underwent an organisational 'transformation'. Its established 'holding company' structure—containing numerous overlapping but standalone businesses, the product of many mergers and acquisitions—was replaced by the five new divisions of a single, integrated, global group. The new matrix structure created a more open and flexible organisation, much richer in opportunity for company and individual alike. Meggitt's bottom line benefits from synergies, efficiencies, economies and collaborations that might otherwise never have happened. Individuals have more chances to grow and break new ground as old boundaries between roles, functions and businesses shift or dissolve.

But in this flexible, fertile world there's much more to turning opportunity into achievement than simply creating a roster of standalone training initiatives. People need new skills and knowledge. But they also need to have their eyes opened to the major part of Meggitt that lies just beyond their everyday horizon, to be given opportunities to connect with it, and then to stay connected. The matrix needs people who understand how to use its creative potential. Welcome to the world of Group Learning & Development.

"Meggitt's transition to a matrix structure and system-based management was changing what it meant to 'lead' an organisation, so training at the group level really sprang out of a recognition that all senior managers would need new mind-sets as well as new skills if they were to succeed as leaders at a time of almost continuous change," explains Eric Ovlen, Meggitt's global head of HR.



Eric Ovlen, Meggitt's global HR head: The matrix isn't about status and control, it's about flexibility, mobility and maximising the richness of our inter-connectedness

Pioneers

Sitting senior managers in a room and just telling them what they need to do differently was never going to get that job done. They would need more than an intellectual grasp of the new Meggitt. They would need to start living it. So the first ever group course, the Meggitt Change Leadership Programme, pioneered an approach that was both active and self-reflective. During two, two-day sessions participants learned about different personality types and explored how best to manage, coach and develop them. They considered their own behavioural 'style', how it might influence others and how it could be adapted to changing needs. They looked at delegation as a staff development tool and discovered how to harness diversity. And they learned how to effect change across the permeable boundaries of the matrix by influencing others. "In a matrix," says Ovlen, "influence is the new power, not status. We can all learn to be influential."

Speeding the new

The most popular leadership modules help participants get the best out of themselves and their colleagues by developing a better understanding of what makes a person tick. Using a tool called 'Extended DISC', participants learn how to identify four behavioural 'styles' (Dominance, Influence, Steadiness, Conscientiousness), including their own, and to assess the impact they have on others. 'Situational leadership' teaches how to diagnose the capability of a team member and decide which leadership style will work best in helping them improve their performance. With so many satisfied senior managers returning to desks throughout the organisation it was perhaps inevitable word would spread that here was a programme far too useful to be reserved for senior managers alone.

Sitting senior managers in a room and just telling them what they need to do differently was never going to get that job done. They would need more than an intellectual grasp of the new Meggitt. They would need to start living it

A key objective for the group was (and remains) to maximise the networking potential of each training programme. Every opportunity was taken to foster new connections and relationships between the individuals (especially across the old 'silo' boundaries) and to reinforce them systematically with practical activities. During the two or three months between sessions participants apply their learning to real projects, working in teams that bridge the old divides.

"This was the very first attempt to create a group-wide harmonisation of practice, thought and language," explains Ovlen. "There had never been anything like it. We were trying to lay the foundations of a new kind of Meggitt. It was so important that we succeed, but we really didn't know how it would be received." But succeed it did, including in ways that a simple head count or check-list of skills couldn't possibly quantify.

"That first leadership programme in 2010 was planned as a one-off, but the word-of-mouth changed all that. Four years later we've run 20 or so programmes for more than 600 senior managers," says Sushma Hayes, who took up her newly-created post of group learning and development manager in 2011.

SPEED READ Training

Most valuable
Group Learning & Development has published Meggitt's first ever training directory. Employee engagement surveys highlight training as among the most valuable and motivating of work privileges. Courses new and old now offer opportunities to build the skills, tools and relationships to succeed at all levels in Meggitt's new global matrix structure.

Networking
A key training objective is to help build an integrated Meggitt by maximising the networking potential of each training programme, breaking down the old 'silo' boundaries. Participants are drawn from across the divisions and, where appropriate, from different functions too.

People skills
The most popular leadership training modules help participants get the best out of themselves and their colleagues by developing a better understanding of what makes a person tick. The techniques have proved so useful to senior managers that they are now being spread throughout Meggitt.

Cross-functional
Group Learning & Development works closely with the functions and divisions to scope, develop and co-ordinate new programmes, making sure they meet local needs and have global applicability and adaptability. A group of new cross-functional courses—metallurgy, airworthiness, negotiation skills, finance for non-financials—teach common skills and knowledge while bridging old boundaries and helping build an integrated organisation from the centre out.

High priority
The expansion of Group Learning & Development activity reflects positive attitudes to training right at the very top of the organisation: Meggitt cares enough about its people to invest in them heavily.

Hayes: "Leadership attendees found the new skills, insights and modes of thought very useful, but soon realised that to get the best out of them they needed others within their management structure to possess them too." The group's response was to create the Meggitt Manager Programme; a modified version adapted to the needs of middle managers. And the democratic impulse didn't end here. Team leaders were soon as keen as their bosses to spread the benefits more widely. "They started asking for someone to visit their sites and teach the behavioural tools to shop-floor teams," says Hayes. "They could see that being able to understand what makes people click, or clunk, is a useful workplace skill for anyone to have." (And it can be pretty handy at home too.) Two new training-to-train courses will now give Meggitt's own HR people the opportunity to acquire the skills and accreditation they need to do this work cost-effectively for the divisions.

In Meggitt's employee engagement surveys, training is highlighted as among the most valuable and motivating of work privileges

That so much of group training's pioneer work with senior management has now achieved such widespread currency doesn't surprise Ovlen one bit. "We all have to learn this stuff as adults because so few of us grew up in matrix organisations," he says. "Most families are all command and control. As kids, we learn to do what we were told, but all the time dreaming of the day when we can be the boss. Trouble is, the control part of 'command and control' is often an illusion. No-one likes to be bossed and it never gets the best from someone. So the matrix isn't about status and control, it's about flexibility, mobility and maximising the richness of our inter-connectedness."

Networking

The feedback from participants on all kinds of group training reveals that the opportunity to network and meet colleagues from other parts of Meggitt is among the things they value most. Ovlen sees this systematic enrichment of Meggitt's internal connectedness seeding beneficial change in every corner of its operations: "Take succession planning as just one example. People are now much more aware of the skills of colleagues in parts of Meggitt they previously thought of as strange and distant lands. When they want recommendations for a vacant post, they no longer think provincially, they think globally. The training has given them a more global idea of Meggitt, and the lived experience of the training, building the new connections into their daily life, has made it real for them."

Even in the classroom the transformation over just a few months has to be seen to be believed: "I have had the pleasure to kick-off programmes and then return on graduation day. On day one only two or three people recognise each other and half the room is too timid to raise a hand. By the last day the session leader is struggling to be noticed because the participants are all so focused on each other. It's very refreshing."

Working with functions

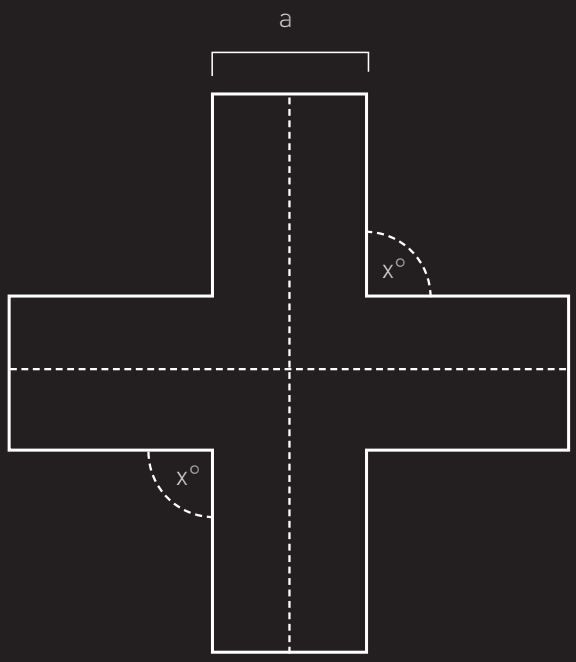
Sushma Hayes is deeply involved in the development of a new generation of functional training being delivered for the first time at group-level. Several of these new skills courses will receive their first trainees this year. Working closely with the leaders of the functions and the divisions, while all the time making sure that the business needs of the integrated "One Meggitt" group are at the heart of the finished product, she is the very model of a modern matrix manager.

"Before, there was no group training function to provide co-ordination, so this is a big improvement. We now have a single, robust process for selecting suppliers and the group-level overview can save a lot of reinventing of wheels. I make sure that while local needs are met, the new courses have global applicability and adaptability—common materials, for example, that are easy to translate and so on. The global aspects of these programmes are already being delivered in French and Spanish, with other languages available on demand." Communication—acting as bridge and co-ordinator for function leaders and divisions working together—is another important part of her matrix-enabling role. "We need to be sure that divisional HRs understand the content and value of these courses so they can really communicate the wider benefits to their business and make sure the right people are nominated in the right numbers." Hayes is greatly helped in this by her five years as HR manager at Meggitt Sensing Systems, Basingstoke: "Knowing what it is like to work at the coalface, I try to engage and communicate carefully and never to overload anyone."

A key concern for Hayes is to ensure that the new functional programmes realise their networking potential. Most of the new courses span the divisions and all of them are infused with group learning and development's matrix-building principles, but several embrace multiple functions—another innovation—giving them a particularly important part to play here. The new metallurgy course, for example, is targeted at employees in operations as well as the 'parent' functions of engineering and procurement. It is designed to give all

> For new learning to really 'stick' it is vital that a trainee's own manager actively supports and reinforces the training objectives

Engineer a brighter future on us



MEGGITT

Institution of MECHANICAL ENGINEERS

A big plus to your career

We have some of the most talented engineers in the world working here at Meggitt.

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participants a much stronger technical awareness of some of Meggitt's most important raw materials. Participants in non-engineering roles may themselves have little or no day-to-day need to handle metals, but this new metallurgy 'primer' helps illuminate the end-purpose of their own work and reinforce their technical understanding of core Meggitt activities. A similar co-operative approach and *raison d'être* has created new courses in airworthiness, negotiation skills and 'finance for non-financials'.

Building strength

Two years ago there was no such thing as 'group training'. Today many hundreds of employees at various levels in the organisation testify to the quality and value of the group learning and development Meggitt provides. And group programmes are far from the whole story of training at Meggitt. There is so much to celebrate among the best of the technical training done at division and site level too, says Ovlen: "Parts of Meggitt are very good at developing the hard skills that local operations need in their machine shops and factories. These too are a valuable part of creating the integrated group that everyone can experience as being rich in opportunities to develop and progress. The group can't take credit for these local activities, but Meggitt as a whole can certainly take pride in them."

> Being able to understand what makes people click, or clunk, is a useful workplace skill for anyone to have." (And it can be pretty handy at home too.)

Hayes has an appetite for making Meggitt a great place to work that is palpable. Its origins outside Meggitt are revealing. In a previous life, at a major multinational, she saw at close quarters how a real commitment to learning and development can be transformational, just as a tin ear for the aspirations of staff can lead to disaster. A concerted effort to increase management commitment to training and team development steadily raised the organisation up through the rankings and into the top 20 of the Sunday Times 100 Best Companies to Work For. Her experience of the dramatic cultural change that was required, with 1800 managers put through intensive leadership development programmes, ignited in Hayes a fierce belief in what training can do for organisation and individual alike: "I am passionate about how you get each person to contribute that little bit more so that together we can make a big difference. You achieve that by bringing people into the conversation, opening their eyes to how they might do it, giving them the tools, techniques and ideas they need, and sending them back engaged, energised and supported. For new learning to really 'stick' it is vital that a trainee's own manager actively supports and reinforces the training objectives."

"In our employee engagement surveys, training is highlighted as among the most valuable and motivating of work privileges," adds Hayes. "It's commonly said that Meggitt is its people—the sum total of their qualities and their skills. Well, the new group learning and development directory is proof that Meggitt cares enough to invest heavily in them."

Ovlen agrees. The expansion of our group training activity reflects the supportive attitudes to learning and development found right at the very top, he says. "You can't make a strong building without strong bricks, and Meggitt's leaders know that."

Meggitt wins multi-million dollar contract for Irkut MC-21 fire protection

Meggitt Safety Systems (MSSI) has been selected by Abris JSC to provide fire protection equipment for the Irkut MC-21 aircraft programme. Under the $50m contract, MSSI will be responsible for aircraft engine and APU fire detection and suppression and cargo smoke detection and fire suppression over the life of the programme.

The MC-21 engine and APU fire detection and suppression will utilise MSSI's extremely reliable pneumatic fire detection and fire suppression equipment.

The cargo smoke detection system technology discriminates between nuisance particles such as dust and pollen and those of smoke, thus reducing the risk of costly false alarms.

The MC-21 cargo suppression system will deploy an initial high–rate discharge, followed by metered discharges that keep agent concentration levels topped up and any fire subdued, extending the opportunity for the operator to land the aircraft safely.

The Irkut MC-21 aircraft is a family of twin-engine, short-range and mid-range Russian jet airliners with a capacity of 150 to 212 passengers being developed and to be produced by Irkut and Yakovlev Design Bureau of the United Aircraft Corporation (UAC) group. The aircraft is due to enter service in 2017.

ABRIS JSC, located in St Petersburg, is a leading Russian developer and producer of modern onboard devices for aviation engine monitoring and diagnostics.

Martin Calland, group procurement director

Calland and his colleagues freely admit that they do not have the time or, crucially, the network of relationships across divisional HR to make sure that their ambitions for group procurement training do not suffer simply for a lack of communication and coordination resources.

"It is fantastic how working cross-functionally promotes networking, helping us all better understand how other parts of the business work. We benefit further, as this model also minimises costs and raises quality because of common standards. None of this would be possible without group learning and development."

Chris Allen, group engineering and technology director

Allen's team worked with Sushma Hayes (group learning and development) and their counterparts in procurement to develop and pilot the new cross-functional metallurgy course. Materials experts took the beta version of the course and helped refine it. The first real students took their seats in mid-May. A similar approach created the new cross-functional airworthiness course.

"A new senior engineer in our control systems division noticed the weakness in our metallurgy training. He saw that a generalist overview of metal types, processes, treatments and failure modes would be very useful to the business and commercial people. It's a good example of how Sushma always has her ear to the ground, listening to the customer and then working with us—procurement and engineering in this case—to spec and develop a solution."

Barry White, group commercial director

Having joined Meggitt as recently as early 2012, White remains visibly enthused by the company's commitment to investing in its people through the quality of learning and development. An important part of his job is to turn individual contracts teams into a single integrated group function, something that technical training alone cannot do.

"We are constantly developing the technical skills mix of our contracts team. But for us to deliver value throughout the entire commercial life cycle we also need them to be able to create effective relationships with customers and suppliers and to partner smoothly with the other Meggitt functions—legal, sales and marketing, programme management. For that they need the behavioural and leadership skills that group training can develop."

Something for everyone

Cruise Group Learning & Development's latest courses

With the publication of the first group learning and development directory, Meggitt's group training offering now contains something for almost everyone.

The creation of this first harmonised offering is, of course, just a snapshot.

Change is rapid right across Meggitt and the matrix organisation, itself new, is moving towards system-based management, with a range of new implementations underway or imminent.

More investment is planned to maintain the training infrastructure a group of Meggitt's size and dynamism needs to best serve the interests of customers and staff alike.

New courses, workshops and programmes are already in development just as existing ones are being fine-tuned, all in line with feedback from employees about what they find most valuable.

Nonetheless the core philosophy of group training holds steady: to maximise networking opportunities for staff in all roles and to send them back to their divisions with the renewed enthusiasm, up-to-date skills and fresh ideas they need to succeed in a global, integrated Meggitt.

- **Senior Leadership Development**
  Meggitt's senior leadership development programme was co-developed with Oxford University's Said Business School, which facilitates and hosts some of the sessions. Future leaders, many of whom have never met, come together with members of Meggitt's strategic management board to address in detail the key questions of group strategy that currently preoccupy them. The sessions provide a fertile environment in which orthodoxies can be challenged, new partnerships forged and shared values reinforced. A key priority is to help participants develop a greater appreciation of Meggitt as a globally integrated enterprise and, through intense networking, to strengthen areas of strategy implementation that depend on the group's ability to collaborate well.

- **Meggitt Leadership Programme**
  Aimed at senior managers drawn widely from across the business, this programme updates skills, insights and tools for the challenges of leading a business in the new integrated, matrix-structured Meggitt. During a pair of two-day modules participants are introduced to a more people-focused approach to management, using tools such as Extended DISC[1] and Situational Leadership[2] to deepen their understanding of the interplay between leadership, behavioural style and individual capability. The matrix structure and its potential are studied closely to identify challenges and crunch points and ways to tackle them by harnessing diversity and influencing others across boundaries. A dedicated module, *Leading Change*, looks at how best to align, engage and lead teams through periods of profound change.

- **Meggitt Manager Programme**
  Similar people-focused and behavioural content to the Meggitt Leadership Programme but adapted to make it more relevant for middle managers, team leaders and supervisors. A greater emphasis is placed on coaching, communication, personal effectiveness and managing conflict.

- **Performance Improvement Workshop**
  This one-day programme covers the what, why and how of performance improvement, including diagnosing underperformance, giving feedback and creating and monitoring improvement action plans. It can be delivered by Meggitt HR professionals and adapted to local policies and procedures.

- **Situational Leadership Certification**
  This five-day programme provides Meggitt's own HR professionals with the skills, knowledge and licenced accreditation they need to train others in the Situational Leadership concepts and tools that form a central part of the Leadership and Manager programmes. Participants attend two core programmes followed by a three-day accreditation course.

- **Extended DISC Certification**
  The use of Extended DISC tools to understand and manage different behavioural styles is a very significant part of the Leadership and Manager programmes. This one-day programme provides Meggitt HR professionals with the skills, knowledge and accreditation to deliver DISC coaching and training using licensed tools.

- **Finance for Non-Financial Managers**
  This programme aims to provide participants with a better understanding of the company's financial processes and procedures, removing the myths and fears that surround finance, helping them to anticipate the financial implications of their plans and decisions and enabling them to better interpret financial information. Participants learn about generalised financial concepts—such as balance sheets, budgets, forecasts and debt versus equity—and Meggitt-specific knowledge including how our bid model works and the uses and definitions of Meggitt finance terminology. The programme is designed to be delivered by specially trained Meggitt finance professionals.

- **Procurement Development Programmes**
  The procurement group has teamed up with CIPS (the largest, globally-recognised body providing professional accreditation and standards) to provide a professional development framework for procurement staff in Europe and the US.

  - **Managing Supplier Performance**
    A two-day workshop designed to help individuals build effective working relationships with suppliers and better manage supply-base performance.

  - **Managing Costs**
    A two-day workshop introducing the essential elements of financial management, enabling participants to use financial information to improve their own performance in planning, control and decision making and providing the tools to enable purchasers to understand pricing structures and use them to challenge suppliers and reduce costs.

  - **Managing Operational Performance**
    A two-day course covering the operational aspects of procurement, looking at issues such as policy, local operating procedures, procure to pay controls and the wider procure to pay processes.

- **Metallurgy**
  Provided by the University of Sheffield's Advanced Manufacturing Research Centre (AMRC), this multi-function course aims to provide engineering participants with a common basic grounding in metallurgy and everyone else with a sufficient depth of metallurgical knowledge to support their own work. In so doing, the course will promote interaction between engineers and other functions so that they each understand the challenges experienced by others in working with various metals.

- **Airworthiness**
  This is a wide-ranging course suitable for all Meggitt personnel. Participants will be introduced to: aerospace industry quality and airworthiness regulations; regulatory bodies worldwide; Meggitt's airworthiness obligations; verification and validation; type certificates, technical standard orders, declarations of design performance, supplemental type certificates, parts manufacture authorisations; qualifications and training obligations; the difference between commercial and military regulation; trade compliance requirements; and much more.

- **Negotiating for Success**
  Four two-day, highly interactive programmes, to be run in the UK and USA, aimed at all Meggitt staff who negotiate internally or externally. Participants will learn: the stages of negotiation and how to manage the overall process; tactics and strategies to help produce a favourable outcome; what is meant by 'win-win' and its importance to success in business; how to uncover the other party's agenda and use the information effectively; ways to negotiate beyond price and apply big-picture thinking; and how to negotiate assertively but fairly to build positive long-term relationships.

- **Group Graduate Development Programme**
  There is now a worldwide shortage of engineers and scientists and this programme—taking ten of the best new engineering and science graduates each year—represents a long-term commitment by Meggitt to grow its own commercial and technical talent and leadership. It is intended to augment the various graduate schemes operated by the divisions. Trainees pass through four nine-month placements in various parts of Meggitt, steadily growing their technical and commercial skills and insights as well as their appreciation of the global business at large. The first cohort of trainees moved to their second placement in June this year.

1. Extended DISC is a tool for understanding the relationship between personality type and behaviour. It has its origins in Carl Jung's work in the 1920s on 'axes of behaviour, later developed by psychologist William Marston (1893-1947) who described four different personality traits which he called dominance, inducement, submission and compliance. During the 1950s Marston's ideas were further developed into a personality profile test by industrial psychologist Walter Vernon Clarke (1905-1978), before being simplified by John Geier (1934-2009) into the DISC assessment tool.

2. Situational leadership theory, previously known as the 'lifecycle theory of leadership', was developed separately by Paul Hershey (1931-2012) and Ken Blanchard (1939-). Its central idea is that there is no single "ideal" leadership style, rather that successful leaders adapt their style to the nature of what must be accomplished and the particular qualities of those who are being asked to accomplish it.

lean machine

Even the most enthusiastic proponents of outsourcing could not have predicted the swift growth of HMDC, Meggitt's outsourcing hub in Bangalore. We find out how Meggitt has made outsourcing work.

Top row—from left to right: Poonthugilan Jayaraman, Vinoth Ekambaram, Haridasan Nallur, Sivarama Krishna, Vineeth John, Sakthivel Karuppusamy, Malar Kannan, Dinesh Babu, Shaik M Asif , Niranjana Gujjar, Ashwin Sowdi, Jai Prakash, Dayesh Karanthatil, Ameen CK, Rahul, Naga Prasad, Krishna Prasad, Praveen Tippa, Gururaj S **Middle row—from left to right:** Sandhya Prasanna, Aneish Abraham, Syed Hussain, Uttam Bharadwaj, Naidu Nallasani, Prakash Ramasamy, Pradeep Arkasali, Nagesh, Anant Pai, Harish Tyagi, Udhay Kumar, Pradeep Karnam, Binu Kumar, Mukesh Perumal, Karibasappa K Mugappa, Kasab Paasha, Santosh Velusamy, Marc Greenshield, Venkatesh Dhor, Ashish Mehrotra, Praveen Ahuja, Sridhara Reddy, Mark Walker, Rakesh Jalawadi, Yogesh Anantha, Harsha Patil, Mohan Ponnusamy, Mahalakshmi Parthasarathi, Radhika Bhat, Arthi Ramachandran, Tulasi NG **Sitting—from left to right:** Neil Wann, Dave Yurick, Girish Madhavan, Veeresh Kumar, Geethesh Mahto, Adithya Ram, Santosh Kumar, Mahesh Babu, Balaji Lenin, Paridhi Jain, Bharani J, Harini YV, Chaithra Jayakeerthy

A young engineer pores over her screen, examining a drawing. She is working late to catch up with colleagues collaborating on the same project. Together they discuss a document they are both viewing on a screen.

None of this is out of the ordinary, except that the young woman is in Bangalore and her co-worker is in the US. She works for the Meggitt facility, HMDC, which stands for HCL-Meggitt Design Centre and which is a division of the technology giant HCL.

For many, outsourcing to India conjures up images of regimented rows of overqualified young people in call centres or faceless resources called up by western businesses to deal with emergencies. Visit HMDC and you will find much more than this. You will find highly-educated and enthusiastic engineering graduates employing Lean working practices and contributing to design projects.

The scale of the operation—now numbering more than 300 employees—could not have been foreseen three years ago when Meggitt's transformation was launched.

"It made sense to consolidate our outsourcing activities with one supplier," says Chris Allen, Group Director of Engineering and Technology. "We wanted to have scale, leverage, buying power. We needed to build economy of scale with one capable partner who could help us grow and could grow with us. Consolidating our outsourcing would simplify our business processes, which would allow more smart engineering to take place."

It's a tremendous pool of engineers and talent that you can bring to bear very quickly

One of the pillars of transformation for engineering was outsourcing. At the time, many Meggitt facilities were outsourcing occasional engineering work on an ad hoc basis, but there was no consistency.

A major motivation was the need to leverage the investment that was going into

outsourcing activities across the group. The training and knowledge going into projects were left behind as each piece of work was finished.

"With a dedicated facility, the training curve would be reduced compared with going from a standing start with each new project," says Allen.

At the time, deep in the credit crunch, the ambitions for HMDC were relatively modest. The architects of the transformation anticipated that by 2012 the engineers at HMDC would number around 160. In fact there are now about twice that number.

quite a bit of experience in the aerospace sector. There were a lot of offshore providers that were more experienced in banking or pharmaceuticals or consumer type products but there weren't a lot of aerospace people."

Other divisions of Meggitt, such as Meggitt Control Systems and Meggitt Avionics, have since followed suit and developed a regular working relationship with HMDC.

As with any outsourcing, one of the main attractions is cost saving. HMDC is keen to capitalise on this by mirroring Meggitt's emphasis on Lean working

The architects of the transformation anticipated that by 2012 the engineers at HMDC would number around 160. In fact there are now about twice that number

"As we exited the credit crunch era, we found ourselves in a very busy period in terms of commercial aerospace bid opportunities," says Allen. "We were very successful with many of the things we bid on and found ourselves very busy developing all of the new projects we won. We had about 200 HMDC engineers in 2012 and now have around 300."

Occupying bright, modern facilities and hosting regular visits from their US and UK counterparts, HMDC's employees identify strongly with their Meggitt colleagues. "I have been associated with Meggitt for all the time I've been with HCL," says HMDC's Senior Regional Sales Director, Abhijeet Chimade. "I take pride in that association. It has been a great journey."

HMDC was not picked at random to earn its place in the Meggitt empire—it had to prove its worth in a competition against other firms. Where it stood out against other suppliers was in its size—it has 90,000 employees with 18,000 working in engineering services and 3,500 in aerospace—and its track record in aerospace.

It had also proved its worth in its work with Meggitt Aircraft Braking Systems since 2006, before MABS—then ABSC—became part of the Meggitt group.

Senior Vice President of Engineering at MABS, Mark Walker, recalls how the relationship started.

"We selected HCL primarily because of its range of capability, especially in the mechanical area. A lot of the offshore providers at the time were more software-oriented and call centre-oriented. They weren't really into the mechanical engineering side of things. HCL also had practices. Much of the progress here is down to the efforts of David Gerson, Meggitt Production Systems Lean Practitioner.

"After several years of pressure I managed to convince HCL to hire a full-time Six Sigma Black Belt," he says.

At the time this was unheard of in engineering outsourcing. "They thought I was crazy", he recalls. "It had never been done in engineering in India."

Thanks to Gerson's efforts, Black Belt Venugopal Ponganti, known to all as Venu, has for the last year been changing the culture at HMDC. Initially, this took a certain amount of diplomacy.

"My main challenge was resistance from people," says Venu. "It's obvious. If you go to a team and tell them they're doing a process in so many hours and that it can be done in a new way ... these things are not so easy. It's a matter of understanding the concept of Lean."

The message seems to be getting through, though. All HMDC employees are undergoing Green Belt training. Within three weeks of their training they have to come back with a project, identifying a process that they can improve and aiming for a cost saving of 5%.

Over the course of the ten projects completed so far, a much greater saving has in fact been achieved.

"There has been an average saving of 52%," says Gerson. "It has tremendous potential."

"The DNA of Six Sigma is strengthening," says Venu, who aims for Six Sigma to become the norm. "Whatever we do, we will do in a Lean, Six Sigma way."

To make the most of these potential savings, Allen encourages Meggitt divisions to work with HMDC in a strategic way. They should, he says, "think of it as an extension of their capability. It's part of their engineering resource and they need to plan for it, to design it into the way they work and to connect their systems. They need to give access to the computer systems, so they can access the data, check drawings out of the vault, change them and check them back in a boundaryless way."

To facilitate this dynamic, a lot of work has gone into removing obstacles. Trade compliance issues, for example, have been largely overcome, even for military work.

"It's a little known fact that HMDC is fully trade compliant," says Allen. "We designed the facility to be a trade compliant facility. 99% of the technical authorization agreements which we have applied for have been granted in full by the regulators."

SPEED READ
Lean Machine

PILLARS OF THE COMMUNITY
One of the pillars of engineering of the Meggitt transformation was outsourcing. The desire to consolidate outsourcing with one supplier led to the creation of HMDC, which now employs more than 300 engineers.

GREEN AND BLACK
To maximize cost savings and follow Meggitt's example, HMDC has a Six Sigma Black Belt and all staff are undergoing Green Belt training. 10 Green Belt projects have so far been completed, with more in the pipeline.

STRATEGIC THINKING
Meggitt divisions are encouraged to engage strategically with HMDC, building the relationship gradually and incorporating outsourcing wholeheartedly into their business.

GOOD TO TALK
The key to making outsourcing work is communication. A clear Statement of Work is essential, information technology can help, but nothing beats face-to-face meetings from time to time.

RESULTS-LED
The best way to prove the value of outsourcing is to show good results. This is not outsourcing for the sake of it and savings and value have to be demonstrated.

Left: Abhijeet Chimade: "We want to be more strategically aligned. We want to be ahead of the curve."

Middle: Venugopal Ponganti: "Whatever we do, we do in a Lean, Six Sigma way."

Right: Balaji Lenin of whom Marc Greenshield, MABS Director of Product Development said: "Balaji won over many colleagues when he spent time in the UK and the US facilities," says Marc Greenfield.

Needless to say, when it comes to outsourcing strategy, MABS, with its long relationship with HMDC, is in a position to lead the way – indeed, Allen refers to MABS as the "poster child" for outsourcing. Marc Greenshield, Director of Product Development (UK) at MABS, explains how the relationship has developed:

"The way the engagement has evolved over the last six years is that we treat HMDC as an additional engineering resource so they're on our headcount as almost full-time engineers working for MABS. The vast majority of departments have a counterpart relationship with corresponding groups in Bangalore."

Some "911" projects have, nevertheless, been successful. At Meggitt Control Systems, Senior Vice President of Engineering Tom Nelson acknowledges that this has been his approach in engaging with HMDC.

"It's a tremendous pool of engineers and talent that you can bring to bear very quickly," he says. "The aerospace industry tends to be cyclic. It's much easier to bring in a whole bunch of people from HMDC."

Nelson speaks highly of HMDC. "They've lived up to my expectations and have supported us very well." He does admit, however, that the more strategic approach adopted by MABS is "the optimum".

Whatever the style of engagement, what all are agreed on is the need for good communication.

"You tend to underestimate the value of having all the people close to one another in your own engineering environment", says Mark Walker. "The weaknesses in your standards and work instructions are overcome by being able to grab someone that's sitting next to you by the ears and ask them the right question, which isn't really an option when you're going offshore."

The answer is to keep communicating.

"You need to over-communicate", says Nelson. "Have a very clear Statement of Work, not only in what you are asking them to do, but also in feedback."

That feedback, says Jerome Evans, Engineering Capability Manager at Meggitt Avionics, should not be confined to things that have gone wrong. "It's evident when you go to HMDC, when they get positive feedback it goes on the wall—they take great stock of positive feedback."

Technology can, of course, help—making data accessible is key to the projects working smoothly. At Meggitt Avionics, Programmes and Engineering Director Simon Riddiford describes its state-of-the-art iRoom (see page 26) as a "useful tool", whereas at MABS the principal communication is done by telephone and through SharePoint sites.

"Making the IT slick and seamless makes a big difference to cost," says Greenshield.

Advanced technology will only get you so far, though, says Evans. Employees need to be encouraged to overcome any reluctance they have about using the telephone over electronic communications and any shyness about not understanding the Indian accent.

"They can get to the point of accepting what has been said because they're too British to go back and ask them to repeat what they said. Actually they're fine with us asking, but we're hesitant."

It's a real, eye-opening moment when they see the facilities, the scale, the people, the enthusiasm

Meeting the team

A visit to Bangalore this year by members of the MABS software engineering team cemented many of the relationships that have been built over the last few years. HMDC's software engineering group is the largest functional area for MABS, so was the focus of this year's visit to HMDC. MABS' Software Manager, Dave Yurick and its Senior Software Engineer, Neil Wann, joined Mark Walker and Marc Greenshield on a visit to HMDC in March 2013.

The visitors spent time meeting and getting to know the software team and were able to see many of the tools and processes employed at HMDC. They were also able to explain aircraft system architectures to the HMDC software verification team to help them appreciate how their work fits into the systems provided by MABS. There was time for some socializing, too, with a bowling evening and time to get to know each other.

These functional visits are essential to the success of the relationship with HMDC, says Marc Greenshield. "After the trips, communication in particular is so much easier."

The need for clear communication also means that it is essential that teams be chosen carefully, according to Riddiford. "The people you put on it should be can-do, problem-solving people who are good at communicating," he says.

Equally important is the need for some face-to-face contact so that the Indian teams are known as individuals rather than just a resource.

"This is a key lesson," says Riddiford. "Only when we get to India and understand the issues that they face do we get mutual understanding."

Marc Greenshield agrees. "Communication is about building relationships," he says.

Greenshield practises what he preaches. He has taken to choosing one of the functional teams from Coventry or the US each year and taking them with him to Bangalore for a week so that they can spend time with their counterparts, getting to know them and understanding their issues.

It made sense to consolidate our outsourcing activities with one supplier

"It's a real, eye-opening moment when they see the facilities, the scale, the people, the enthusiasm. It makes communication so much easier when it's someone you have dealt with face to face."

Good communication and contact with Indian colleagues also help to overcome any internal resistance to outsourcing that might arise, the reasons for which are not hard to understand, according to Chimade.

"The aerospace industry is one of the oldest industries and it's always a debate about, 'Hey, we've been doing this for 25 or 30 years, how can a bunch of kids come in and help us?'"

The solution, according to Walker, is to engage the functional management.

"Make sure the functional management is completely engaged and has ownership in the success of HMDC. If you get the ownership at that functional area level, it helps to break through that [resistance] because it's not the initiative of the Senior VP of Engineering any more. You've got to get the guy that's managing that group to help the group understand why this is important and why it helps."

Ultimately, though, what really brings people round is results. As Walker says, "You can't just be offshore for the sake of offshore."

Here, meeting the HMDC employees in person is key, as Greenshield explains. "Building these relationships ultimately makes it work or fail," he says.

He describes how one member of the HMDC team, Balaji Lenin, then a lead engineer for mechanical design, won over many colleagues when he spent time in the UK and the US facilities learning the processes and the products and later in an onsite coordinator role.

"Where Balaji stands out is that he is technically very good," says Greenshield. "It became very clear very quickly that he was a very competent engineer and that set the tone. On top of that his communication skills were very good—he's a very friendly, happy-go-lucky, people person and that helped him to integrate very quickly with the US teams and the Coventry teams."

Another key element in persuading people of the value of the relationship is to build it slowly. All the advocates of outsourcing agree that it is best to start small and build the skillsets gradually rather than leaping straight into project work too quickly. Chimade explains: "Aerospace is a very big industry and we don't always understand the systems in and out. We need some training."

The challenge with this, as Riddiford acknowledges, is that "engineers like to engineer, not manage people". Nonetheless, he says, over time the relationships "develop really well" and the investment pays off.

The DNA of Six Sigma is strengthening

Walker agrees. "They've really figured out how to add value," he says. "They can say, 'Hey, look at what these guys are doing over here in Coventry, it's a much better way than what you've been doing in Akron. You have to listen to them because they don't have a bias, they're very objective and that's helped."

Looking ahead, it remains to be seen how the engagement will develop—as Allen acknowledges, "You can never predict the future." What does seem clear is that outsourcing will continue to feature in Meggitt life. "It's here to stay," he says. ●

Six Sigma in action

HMDC team member Heena Victor (below) displayed the potential of continuous improvement in a project she was working on for Meggitt Training Systems in Suwanee. While working on approximately 200 AutoCAD wire harness drawings, she noticed that certain steps repeated in each drawing, such as changing the units to inches, specifying the font style and creating a wiring table, were taking an average of 10 minutes to complete. They also allowed for human error to creep in.

Victor instead created a macro that automated much of this procedure.

"It reduced a major chunk of drawing creation time and saved approximately eight minutes per drawing," she says, noting that the macro can, with slight modifications, be used in other applications, too.

As HMDC creates approximately 1,000 AutoCad drawings per year, Victor's macro could save around 140 hours per year.

Fêted as the next 'disruptive' technology in an ever-growing mound of press cuttings, Meggitt is already using 3-D printing for aerospace components. Led by Meggitt Control Systems, the group's research and technology team is coordinating a project to put the group's 'Additive Layer Manufacturing' capability on the map, creating its own powders, forging its own design methodology and, over the long term, perhaps even making its own manufacturing equipment. For now, it is content to create a supply chain ready to design and certify a product for a military jet.

Additive layer manufacturing—or 3-D printing—comes into its own with small, complex parts such as the gimbals and joints being developed by Meggitt Control Systems, Dunstable, UK for the Saab Gripen. Stewart Chapman, Engineering Director, holds the first prototype gimbal ring manufactured using Meggitt's own additive layer manufacturing process.

It's not quite as rapid a process as the science fiction 'replicators' that instantly produce objects or food on board the USS Enterprise in Star Trek, but in terms of producing something out of (virtually) nothing, it comes pretty close.

I want to build a complete valve out of components made from 3D printing, strap it on a test engine and run it for 4,000 hours

A decade ago, Additive Layer Manufacturing (ALM) seemed right on the boundary between reality and sci-fi. Lasers are used to melt a dispensed stream of plastic or metal powder into virtually any shape required, through extremely precise, multiple computer-controlled passes that build up an object layer by layer.

Today, the machines that seemingly conjure objects out of thin air can be bought for around £8,000 and ALM—often referred to as '3D printing'—is about to become a part of everyday life.

They hit the headlines in May when a small US company used them to create a workable gun, then promptly put the blueprints on the internet. The US Government ordered it to take them down, but by then the genie was out of the bottle and, within days, the blueprints had been downloaded more than 100,000 times.

When combined with the necessary software to work out stress loads, ALM can be used to design virtually any object—often in forms that would be impossible to manufacture by conventional methods.

What would previously have been solid objects can now be made hollow, with internal lattices or structures to absorb or transfer loads. Often, those internal structures have a distinctly sinewy, organic look, resembling the roots of a tree.

"There are no restrictions. You can do whatever you like," says Stuart Chapman, director of engineering at Meggitt Control Systems (MCS) Dunstable, who has been involved in R&D on ALM for several years. "From a CAD point of view, it's fantastic, because CAD designers can create any shape they want.

"ALM is not quite cost-effective yet because it's a new process. However, we're working on a couple of jobs where it's just breaking even in comparison with existing techniques, so that's a good sign that costs are coming down."

In fact, one component, for ducting on Sweden's Saab Gripen combat aircraft, has for the first time been created more cost-effectively by ALM than by traditional fabrication methods.

Meggitt has been watching the development of ALM closely in recent years, says Chris Allen, who recently took over the role of Group Director, Engineering & Technology, from Richard Greaves. It currently uses small external companies that specialise in the technique to have early prototypes made out of thermoplastic, giving staff the opportunity to pick up and feel real objects.

"We're now pulling it all together in a Meggitt group project," says Allen. "We want to stop shallow, misaligned investment and make a big splash. A couple of our graduates have been assigned to it—Scott Lathrope in MCS in California is the lead, with John Borton in Birmingham assisting him. MCS are the ones who have done the most and are effectively lead division but it's a group-wide approach.

"Scott's full-time job is driving the ALM agenda while John is part-time on it."

There are three main strands to the group's research into ALM:

- 'Characterisation' of materials that will be used in powder form to create objects. Characterisation means understanding a material's tensile and fatigue properties. The aim is to create a Meggitt specification for powdered materials such as inconel.

- Design methodology. "To make optimum use of this you really need to be a mechanical engineer that's never done design before, so you're unencumbered by traditional

thinking," explains Allen. Software is then needed that can take details of the object's required capabilities and loads and interpret them to create the best shape.

- Machine technologies and processing development. Meggitt will probably not manufacture its own ALM machines, but needs to think out how it sources the equipment and materials so it has a robust supply chain.

Lathrope, who joined MCS just under two years ago, had previously used ALM machinery at university. "After about three months working here I was given the task of 'Go figure out everything you can about ALM'.

"I spend a lot of my time on spec development: testing models, getting the data back and condensing it into something we can use in a spec. A lot of the interest comes from the engineers and a lot of people want to see examples [of ALM].

"It's an exciting field to be in. I think in five years it's going to be showing up in production in almost all of our product lines, because it's so universally applicable."

So, what could be replaced by ALM? "Initially, small complex, parts is where it would come into its own," says Allen.

"We'd be working on 'parts of parts', for example, valve bodies and solenoid valves. You can embed galleries or wireless sensors into these. We can provide additional functionality as well as flexibility. You don't need to keep complex parts on the shelf. You order and print it."

This is a step-change for heat exchangers, which haven't really changed since the Second World War

MCS Dunstable, for example, has made considerable progress in gimbal joints and ducting.

"We plan to qualify this technology on the Saab Gripen. We don't know exactly what components it will be, but it will be something to do with the ducting."

One area in which ALM is more efficient than traditional procedures is that only the precise amount of material is used to create an object. Currently, many such objects are milled from a billet of metal, most of which ends up on the floor. That waste can be collected and recycled, but adds time and cost.

And, when using exotic materials such as titanium, sourcing large billets can be difficult, with long lead times required when ordering the raw material.

Meanwhile, there is a second form of ALM in which Meggitt is investing. Heatric uses etched plate manufacturing technology to build up the cores of its heat exchangers and the group has acquired a company that can do this at micro level.

"Heat exchangers need to be square or cylindrical," says Allen. "They need to sit in the airstream and can be quite obstructive to engine designers. ALM may be used to create shaped coolers, custom-designed to tuck into an area around the engine. "You can't do that with traditional methods. This is a step-change for heat exchangers, which haven't really changed since the Second World War."

Left: Andy Marsh, vacuum tester, with the Ariane 5 launcher's traditionally manufactured gimbal joints

Below left: Phil Bond, sheet metal worker, inspecting ducting, again, made using traditional manufacturing methods for the Rolls-Royce MT30, a marine gas turbine engine

Below: Five-inch gimbal joints. Left to right: Fabricated gimbal; contrasted with gimbal and gimbal ring made via additive layer manufacturing, plus an optimised solution on-screen

When ALM first appeared around a decade ago, the products that emerged were not up to aerospace industry standards, says Chapman, However, with the technology moving forward rapidly, Meggitt kept tabs on ALM and found an external supplier that had done some impressive work in the sector.

The specialist knowledge required to use ALM still tends to reside in external suppliers, but there is a groundswell of opinion that sees the technology coming in-house in the future.

"If we brought it in-house right now, because the process is moving so quickly, the equipment you bought would be out of date in a year and the size of components you can make on them is relatively small," comments Chapman. "So, there's a little bit of uncertainty as to whether this is the right time to invest in the process."

In five years it's going to be showing up in production in almost all of our product lines

Some ALM components also require finishing or heat-treating to 'set' the required strength levels of the material, although tests have revealed that the latest ALM components have strength and composition comparable to those made by traditional methods.

With ALM work being carried out at sites in the UK and US, it can be regarded as the first group R&D project and an example of the One Meggitt approach. It is something of a success for the so-called 'strategically-managed, interrelated group'.

Keeping the three sites in Dunstable, Birmingham and North Hollywood up to speed with each other's progress is accomplished quite straightforwardly with e-mails and fortnightly telephone conference calls.

Graduate project engineer John Borton joined Meggitt last September and has been spending progressively more time on ALM since December, assisting Scott Lathrope.

"I've been looking at the software and design side of the process. I've put in a request for some very specific optimisation software. This helps design the most efficient structure of an ALM object, frequently incorporating an internal lattice structure that could not be produced by traditional manufacturing.

"Utilising a lattice structure within a product as opposed to having a solid product allows for a much lighter structure.

Graduate programme trainees, Scott Lathrope (above) and John Borton (below) are looking at the new software and design processes needed for 3-D printing's internal lattice structures.

Current metal products carry a lot of excess weight, which by using ALM, could be taken out and only leaving the enough to support the structure under its load conditions."

ALM, he says, is highly significant technology: "It's something that could shape the industry in my lifetime.

"We're hoping to be one step ahead of everyone else when the Original Equipment Manufacturers know what they want from it."

We will be light years ahead of the pack

This point is taken up by MCS president Jim Simpkins, who has watched ALM's emergence as a technology. "I feel it was imperative for MCS to be an early adopter of the technology, partly because one of our largest aerospace customers is at the forefront of it and is closer than anyone else to putting 3D parts into mass production.

"We need to be making significant inroads on our own," he says, so that Meggitt can show the client that it, too, has a pedigree in the technology.

"My vision is I want to build a complete valve out of components made from 3D printing, strap it on a test engine and run it for 4,000 hours." Even if it failed that endurance test, the failure would show Meggitt's designers what they have to do to eliminate any flaws.

If the project goes well: "We will be light years ahead of the pack." Senior executives in major aerospace companies such as Pratt & Whitney, Rolls-Royce, general Electric and Safran "are awfully curious about what we're doing". ●

Defeat Four Ds, says top Meggitt supplier

Meggitt has just completed the first of its global conferences for élite suppliers. The message is: share risk, rise to the challenges set by customers and reap the rewards of mutual success with a growing group.

Distance", "dominance", "dissonance" and "discomfort" are, according to TT Electronics Integrated Manufacturing Services, the primary reasons why supplier relationships fail. Rob Wood, TT Electronics' Global Account Manager, described these relationship blockers at the third of Meggitt's first programme of global conferences in Bournemouth, UK in April.

Some 24 suppliers were recognised for achieving 2013's targets—in 2012. These included 1500 parts per million defects (or less) and 95% on-time delivery.

TT Electronics carried off the top award in Europe, delivering "breakthroughs in relationship development and management with Meggitt," according to Martin Calland, Group Head of Procurement.

This involved winning the confidence of exacting Meggitt Sensing Systems customers who require a world-class supply chain to ensure the delivery of imminent high profile and highly commercial programmes such as the VM600 ground-based power plant monitoring system for Siemens, Alstom and others and tyre pressure monitoring units (TPMSs) for Bombardier.

"TT embodies the supplier relationship Meggitt aspires to," says Calland. "Its secret is embodied in the defeat of the Four Ds." (see box right). Eddy Schwab, Meggitt Sensing Systems' Head of Supply Chain Management (EU), highlighted TT Electronics' role in optimising the design of the tyre pressure monitoring unit for manufacturing as a result of early project collaboration.

Hot on the heels of the Bournemouth Conference, at Long Beach, California, R D Abbott won US Supplier of the Year for its "close alignment" with Meggitt Polymers & Composites' facility in Oregon. According to the division's Strategic Director, Procurement, Richard Pye, "R D Abbott took time to understand its customer's requirements, supporting the facility with 100% quality and on-time delivery and significant materials cost reduction."

This year's conference programme, like that of Asia's last year, is 'reverse marketing,' says Calland. "We are selling the benefits to our preferred suppliers of working with us. Meggitt is a substantial concern with expenditure exceeding $500 million a year. That amounts to 1.8 billion pieces, with 65,000 part numbers around at any one time and 750,000 line items or individual deliveries."

Building an élite

But the spend is too diversified, Calland explains: "We are looking to develop a much smaller group of élite suppliers who are capable of sharing risk. In return, there are the rewards of working with a developing group that has grown 400% in a decade and achieved a compound annual growth rate of 17%."

The conferences were aimed at the top 100 or so suppliers in each region, mainly existing partners with the potential to develop with the group. The conference title, 'Growth through performance", is the theme that unites Meggitt with its chosen supply chain.There is no difference in the messages given to the European, Asian or US supply base. Calland confirms: "We are a global organisation with global requirements and we operate a global supply chain."

Customer pressure is also making intimate partnerships with the supply chain essential. Calland explains: "Our customers are looking for levels of performance and delivery and quality that outstrip previous acceptable standards.

TT Electronics wins Meggitt's Supplier of the Year Award, Europe for exemplary performance in 2012. *Left to right:* Steve Harrington, Head of Operations, Meggitt Sensing Systems; Rob Wood, TT Electronics' Global Account Manager; Martin Calland, Meggitt Group Head of Procurement; Gary Allen, UK Managing Director, TT Electronics; Jason Arnold, TT Electronics' Business Development Manager; Pierre Jagnoux, Meggitt Sensing Systems Procurement Director; Eddy Schwab, Meggitt Sensing Systems Head of Supply Chain Management (EU)

At the same time, they are looking for cost reductions. That means levels of operational excellence that match or exceed those we are setting ourselves with the Meggitt Production System. We are firmly moving away from price to value-based transactions."

Meggitt leadership flies the flag

Chief Executive Stephen Young's opened the conference by emphasising Meggitt's commitment to raising quality and delivery to meet customer expectations. "Good enough is no longer good enough for our customers," he observed, reinforcing the opportunities for Meggitt's chosen suppliers given the increasing scope and scale of the Meggitt group.

These sentiments were reinforced by a series of presentations from the group's operations team—Amir Allahverdi, Group Operations Director, Ian McMurray, Group Quality Director, Calland, of course, plus specialist Meggitt speakers on trade compliance: Natasha Allen, Meggitt's Export Compliance Manager for Europe and in the US, Janet Pierce, Meggitt's Head of Compliance. The Bank of America and Barclaycard, which manage Meggitt's payables programme (P Card), spoke on cash management. TT Electronics spoke in Bournemouth on customer relationships and in the US, R D Abbott.

Keeping it real

Later, attendees were able to engage in detailed discussions focusing on individual Meggitt divisions through workshops on new product introduction, specific programmes, supplier support and evaluation and where they need to place emphasis—from vendor managed inventory to parts per million quality reductions.

Across the board, there was much discussion about the importance of engineering teams working closely together to ensure that manufacturing costs can be eliminated from product specifications at the earliest design stage. "This is something we are used to doing with customers but we need to check back with our supply base, too," says Calland, who accepts that Meggitt needs to be challenged as much as challenge.

Calland is keen to see an end to 'over-the-wall' e-mail culture in which drawings are not always dispatched to suppliers without a verbal briefing or where specifications are incomplete or ambiguous. Calland states: "We can't be disappointed with suppliers if they don't quote or provide costings that aren't what we expected because we did not communicate with them properly."

Suppliers key to opex

The advent of the Meggitt Production System featured strongly in presentations. "Inside and outside Meggitt, the link between procurement and operations excellence cannot be overemphasised", he says. "You cannot achieve operations excellence without a great procurement function as 60 to 80 per cent of what happens on in production depends on a network of suppliers.

"That's why our team is committed to ensuring that procurement is the strongest function within the operations excellence discipline.This conference programme is just one lever of change for the best." ●

Delighted or disappointed with your suppliers?

The answer will depend on whether you are conquering or succumbing to what TT Electronics describes as the four Ds—the big downers on customer relationships

4Ds

Distance: regional, social, tribal language—and overreliance on e-mail

Dominance: supplier: customer team imbalance—misperceptions about the perceived value of one team over another

Dissonance: conflicting deadlines and different agendas—lack of transparency in priorities and disappointment in execution of actions

Discomfort: power struggles and trust—difficulty in tackling issues and challenges

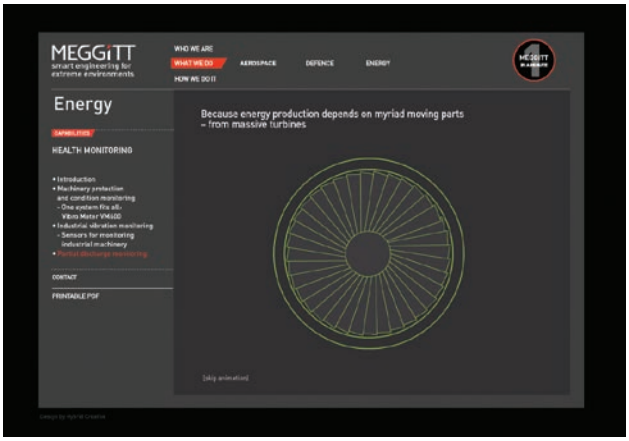
Contact **martin.calland@meggitt.com** for further details.

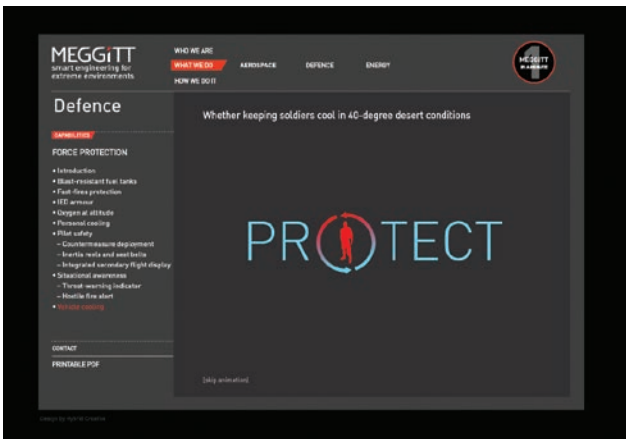
Series of presentations from the Group Operations team: *Above left:* Amir Allahverdi, Group Operations Director, *above right:* Natasha Allen, Meggitt's Export Compliance Manager for Europe and in the US, *below left:* Ian McMurray, Group Quality Director

Listen to Chief Executive Stephen Young's address to Meggitt's European suppliers by accessing The Conversation, Meggitt's employee communications space on www.mymeggitt.com/theconversation

Bookmark our story

While preparations are underway for the launch of a brand-new Meggitt website, we continue to tell our story to investors, potential recruits and customers through through existing web assets.





www.meggitt.com/e-tour

The Meggitt in a Minute e-brochure now features a journey through the group's energy markets and a dedicated defence section.

www.meggitt.com/our-heritage

Meggitt's popular history has been distilled into a download for print.


Our history

In the beginning was the altimeter

We started with an altimeter aboard an 1860s hot-air balloon. Today our products continue to buoy the group through their leading-edge technologies designed to operate in extreme conditions.

Meggitt has come a long way since its first constituent company, founded by two immigrant Italian craftsmen in London, began making aeronautical instruments.

Through the decades we have developed inventions that have transformed our industry sectors. Along the way we have made acquisitions that, in turn, have transformed our company.

Inventions by companies that are now part of the Meggitt brand included spark plugs and pneumatic tyres to help tame the new-fangled automobiles of the first decade of the 20th century. Specially-developed alloys made possible the engines of the new generation of Second World War fighter aircraft. Post-war Meggitt equipment went into the stratosphere with Concorde and to the moon with the Apollo programme.

Traditionally, conflicts accelerate technical progress and bring ingenuity to the fore. The Second World War, for example, saw tyre specialists Dunlop branching out into exotics such as inflatable dummy vehicles, while sparking plug manufacturer Lodge won the accolade of a public endorsement of its products by President Roosevelt in an address to Congress.

"Through the decades we have developed inventions that have transformed our industry sectors. Along the way we have made acquisitions that, in turn, have transformed our company"

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Our history

This publication The Meggitt Review is Meggitt PLC's magazine for employees. Headquartered in the UK, Meggitt is an international group operating in North America, Europe and Asia.

Meggitt Known for its specialist extreme environment engineering, Meggitt is a world leader in smart engineering for extreme environments in aerospace, defence, energy and speciality markets.
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