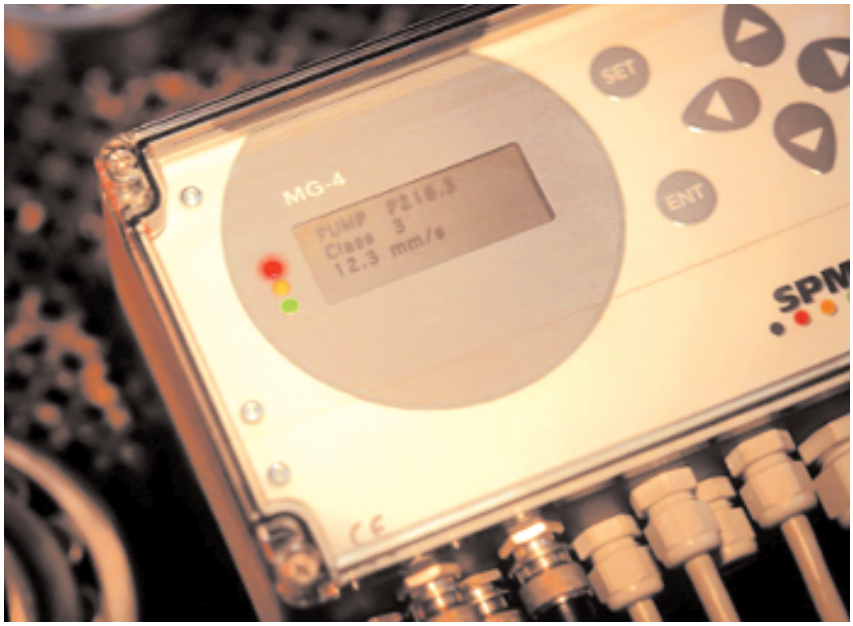

Zero failures mean massive savings

When Centrica installed SPM Instrument UK's technology seven years ago, it was purely for maintenance purposes. Today, that technology has evolved into an environmental management tool that has contributed to the company achieving savings of £1m/year. Val Kealey visited Centrica's Windsor headquarters to find out more

KEY FACTS:

- SPM technology has contributed to savings in excess of £10m over seven years for Centrica
- By ensuring that equipment runs efficiently, the company benefits from energy savings
- Spares are no longer stored 'just in case'

Integrated energy company, Centrica is a top 30 FTSE 100 company with growing energy businesses in the UK and North America. As one of the largest installers of energy efficiency products in the UK it is keen to promote energy efficiency within its own buildings.

The technology that is helping the company achieve these aims (SPM's MG-4) was originally installed to perform condition monitoring on bearings in building infrastructure equipment such as pumps, motors and fans, as Brian Amos, building services and facilities manager, group property, Windsor, explains: "It all started about seven years ago. We employed an outsourced facilities management company and Nigel McElveney was the maintenance manager. He was one of the main instigators of what we call condition-based monitoring to Centrica (and British Gas, part of the Centrica group). At the time we had 1.5 million ft² of space which we occupied primarily ourselves and maintained somewhat traditionally. We were starting to embark upon quite a lot of business change and, as a result, there were financial savings requirements that we had to consider – premises and the maintenance of them being one of the areas where we needed to look closely at what we spent, and how we did things. We had to go back to square one: Why do we maintain buildings?"

Amos comments that seven years ago the company was spending £9m on planned preventative maintenance over a 12 month period and that this was primarily just on the mechanical/electrical systems within the buildings. Nigel McElveney's background was in the nuclear industry where, comments Amos, "they like to minimise the human intervention element of decision making." Over a couple of months they looked at whether they could use some of that thought process to how they maintain their buildings.

Amos continues: "One of the issues with maintaining buildings is that if you've got resident engineers you're paying for the associated salary and overhead costs which are potentially unnecessary. You'd generally be paying, seven years ago, £60,000 for someone to be sitting on site and ultimately waiting for something to break down. We looked at how we could utilise technology to maintain buildings, taking the reactive element out of it, ie carrying out a planned preventative maintenance schedule and then ultimately sitting and waiting for something to happen. Perhaps one of the most surprising facts is that 80% of breakdowns in buildings happen *after* a PPM schedule has been carried out."

Amos looked at the building, the infrastructure and its main components. He says "When you break down a building there's not a lot to it to pull air in from outside, bring it into the building, get it to a certain temperature and put it into the offices. That's primarily all we do. Nothing fancy, no rocket science. Looking at it simply, it's effectively a square box. People sit at desks and want nice comfortable temperatures and low CO_2 levels so they are happy and productive. We looked at all of that. We looked at boilers, flue gas analysis, and pumps, motors and fans because these are essentially the biggest elements of trying either to push water or push air around a building. All of these elements have bearings in them and those are the things that tend to go wrong. We had to look at how we could monitor those because when we broke it down, we were spending a lot of time and money on maintaining pumps and motors and, mainly, bearings."

McElveney had used SPM technology successfully in the nuclear industry and was keen to see whether it could deliver the same benefits to Centrica while, for Amos, the goal was to find a system that would enable him to manage the Centrica portfolio remotely. The solution, he believed, was to create a system that stood above a building management system.

He comments: "Because we only lease buildings, we could end up with a new BMS at each place, so we developed a piece of software to sit above these which would work with SPM to communicate the information that was being produced by the SPM equipment back into our systems and which would tell us the impact that it was having on the buildings. It also gave us the ability to manage the maintenance regimes effectively. Once we had done that, we were

Continued on page 30

able to rewrite all our technical specifications around maintenance and by doing that it actually gave us a cheaper PPM costing. We had fewer breakdowns and ultimately that's where we were trying to get to – to give engineers the ability to be more proactive when looking at buildings instead of just waiting for something to breakdown.

"We've used SPM's Shock Pulse system now for about seven years. There have been no failures with the bearings, which is exactly what the system's there to prevent, and no catastrophic failures at all which is fantastic. I can sit at a PC at any time and know exactly how all my buildings are performing through a simple traffic light system that SPM developed.

"It's very simple for engineers: If they see that the light is green, they don't have to do anything; if they see the light is amber, they know they need to do something; if they see that the light is red – the equipment requires immediate attention. It's as simple as that and we use the basis of the SPM technology in all our other equipment too. Using manufacturers' recommendations we were able to key into our systems the profiles of when something was working right and not working right through a simple 'If it's working right it's green, if it's not working right it's amber and if it's about to fall over it's red. Technically, because of the green, amber, red system there is no need for a known issue to ever progress to critical status as the issue would have ben identified proactively when it first reached amber status. You can use this simple process on anything – such as the co-efficiency of a compressor on a chiller for example."

Amos is impressed by the savings achieved by the technology to date: "We have spent about £1.4m with a 1.2 year payback and that's ongoing." He adds that, so far, savings have been in excess of £10m and these will grow for as long as the system remains in use.

Although the SPM system was introduced purely for maintenance purposes initially, Amos now sees it as an effective environmental management tool. He says "By ensuring that plant and equipment are running efficiently, there are massive add-ons of energy saving which, calculated out, have massive add-ons to the CO_2 output from buildings. The Government has dictated that by 2019 all commercial buildings will have zero carbon emissions. With the systems we have in place now we know to the date, to the minute, what our carbon emissions are – through the SPM equipment, through sub metering of the electrical requirements of the buildings and the electrical requirements that their kit uses. We know to the ounce the carbon being produced by us as an organisation. That's a big add-on benefit for us as a utility because we've been able to go out there and say to everybody 'If you want to know, take a look, the information's available online'.

"Inside one of our British Gas brands we've created a business called Energy 360 and we're now embarking on selling SPM technology to third parties. The Governments of the world have created a multi-million pound industry trying to save the planet. It's all about carbon, CO_2. Every decision we make is all about carbon. What is the carbon impact?"

Another benefit highlighted by Amos is that Centrica no longer needs to keep critical spares on site which, for the Windsor HQ alone, would be in the region of £90,000 worth of stores. "I don't keep that now because I know if I've got kit that goes from green to amber, I've got time to source required parts before it hits red," explains Amos. "So, if the engineer says it's going to take four weeks for spares to come from Italy for example, I can give the go ahead to order them as needed in good time. I don't keep wasteful spares that could sit in boxes for 10 years to go rusty or become outdated."

The SPM system also saved Centrica from a costly problem when it took over a new building in Leicester some five years ago, as Amos explains: "The developer had carried out the Cat A fit-out (floors, ceilings and lights). The developer's main contractor then would normally present us with a big book with all the commissioning data confirming that all systems are running, all electrics are fine, and so on. We, under our fitter, had put SPM equipment in and as soon as they switched the system on, everything went to red. The building had been commissioned wrongly and would have cost us £150,000 to resolve had we not had the SPM system in place to warn us of the problem with our brand new building."

Amos says the SPM equipment enables Centrica to be a lot more confident in how its buildings are operating (or rather being operated) and believes it gives them greater confidence when they're putting together business continuity plans, when risk profiling buildings, parts of buildings and parts of businesses within those buildings. He says "It enables us to be more confident in failure rates and ultimately it's cheaper. A lot of people recognise the '£' sign. I could talk about risk profiles until I'm blue in the face, but when I say I'm saving a million pounds a year, they'll say that's absolutely job done!"

A measure of condition

Installed at Centrica, SPM Instrument's MG-4 is designed for the continuous monitoring of anything that has rotating parts. While it can be used to measure the state of individual machines, it can also form a key part of a total online solution.

The MG4 family comprises four programmable measuring units for vibration severity (VIB) and bearing condition (Shock Pulse Method). The difference lies in the channel combination.

The Shock Pulse Method identifies the weak shock pulses from rolling element bearings and uses these as the basis for condition monitoring . Shock Pulse meters measure the shock signal on a decibel scale at two levels; any surface damage on bearings causes an increase in shock pulse strength and a change in the characteristics between stronger and weaker pulses.

Shock values are translated into measurements of relative oil film thickness or surface damage, whichever applies.

It is seven years since the system was installed at Centrica, and although new products are available, Stan Jackson, managing director of SPM Instrument UK, believes he would still opt for the MG-4 for that particular application. He says "One of the reasons we went for the MG-4 was that if we had gone for one of the bigger on-line systems, extra costs would have been incurred. Generally speaking a server room doesn't have a lot of plant in it so, if we wanted to do things like wiring or trunking all the way back to a central point, there would be add-on costs. We can minimise these by putting local controllers to the machines and that becomes far more cost effective. We needed a MODBUS conversion into the BMS PC over the internet.

"If we were talking day one today, we would possibly go down the same route because even though we've got brand new products, we still see the MG-4 as the fit for the job."