



The "freeform" style of office needs a flexible HVAC system



IGS Interview: Jackie Blanden

Director of **PROTEK**, the high performance energy efficient underfloor air conditioning systems company based in Sweden, Jackie Blanden spent an afternoon discussing the many advantages of this unique system with **IGS** in a mutually favoured Malaysian restaurant.



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The interview was booked for the day before but a presentation at an architectural practice in London ran well over time, such was the interest from the company, so our restaurant rendezvous was a way of making amends. We were walking and talking well before we entered the restaurant.

Jackie: *The presentation usually takes a couple of hours, only this time the questions afterwards lasted the same length of time if not longer. They really wanted to know everything about the system and asked some searching questions. I expect they will have more questions when we follow up on the presentation later.*

IGS: That all bodes well then, clearly they liked what they heard and saw.

Jackie: *Well yes, it seemed so.*

We finally arrived; I opened the restaurant door and followed Jackie inside. It was a warm bright afternoon; the sun was beaming through the skylights and windows, bathing the interior of the restaurant with natural daylight which always puts us in a good mood.

IGS: The Company has been interested in the preservation of the environment for quite some time; can you tell us how Protek underfloor HVAC system came into being?

Jackie: *Protek's main shareholder, Redab Plc, is a property developer which has always been committed to providing high quality offices for tenants while ensuring good financial returns for its shareholders. Redab looked for a system which would give its projects advantages right from the start by being easy to design and fast to install, reduce the design and construction period, and give the tenant a healthy indoor environment, flexible office layout and a low energy air conditioning system ... and so the underfloor air conditioning system came into being. Eventually, Redab found a Swedish company called Protek which manufactured the system components and, wanting to secure the product and influence the technical development, bought the company. Under Redab's management, Protek has developed an integrated system, including ventilation and focussing on energy efficiency.*

IGS: When companies develop a new innovative product as you have, it always intrigues me how you get people to know about you.

Jackie: *We have been making presentations about the advantages of the system to architects and mechanical consultants. We sponsor round table discussions at MIPIM, and we also sponsor the Architectural Review Future Awards Tall Buildings category. Perhaps IGS should host an event we might be keen to sponsor.*

IGS: I'll keep that in mind. Protek is an underfloor heating system (with raised flooring) with all of the fittings and connections in the gap between the ground and the floor tiles. Why can it not be installed in a suspended ceiling?

Jackie: *Well it's much more than a heating system, it's an air conditioning and ventilation system; and the whole point of doing it underfloor is to remove the inflexibility, complicated installation and the myriad of unnecessary components which are required in a ceiling system.*

Having the system "under the floor" offers many advantages over a ceiling system. First of all, from a purely practical point of view, it's much easier to work at floor level than at ceiling level, so installation is safer and easier, requiring no scaffolding or ladders and resulting in savings in the cost of building work and a safer building site. Then by introducing the conditioned air at floor level, we are immediately air conditioning the area which needs treating, i.e. at "body level" where the people are sitting and working at floor level. Whereas, if the conditioned air is being pushed into the room from the ceiling, then it needs to travel a longer distance to reach the "body level" where people are sitting and working. Here again, the underfloor system wins over the ceiling system because it uses less pressure to deliver the conditioned air and also does not need to cool or heat the conditioned air as much, resulting in energy savings and importantly a draft free and more comfortable indoor environment for the end users. So it uses less energy and less pressure for doing a more efficient job.

IGS: Point well made Jackie; it makes perfect sense when you put it like that, why this hasn't been thought of before?



The ventilation and air conditioning has to meet high density usage

Jackie: People get comfortable and don't like to change; they think what they have works so why change it? But there have always been complaints about the air blowing from above, the cold coming in at your neck, it's a common complaint but they get blasé and think they have to live with it.

IGS: As far as you know are there other systems like this anywhere in the world?

Jackie: There are other underfloor systems but Protek is unique in offering an integrated system, including ventilation, cooling and heating, energy efficient components as standard and energy optimizing during the warranty period. Finally, Protek's HVAC BMS (Building Management System) is the glue that ties this system together.

Our HVAC BMS is especially designed for underfloor operations in that we use temperature and not pressure to control the system. We use a digital controller which only needs an internet browser to connect to the controller's IP address so no software needs to be downloaded, no license fees to be paid. We also provide a "BMS PC", already programmed and pre-installed at the factory, so all our units can be monitored and altered by accessing them at this BMS PC, or from anywhere via the intranet or internet.

We are really different from most HVAC providers in that monitoring and optimising of the system by Protek during the warranty period is part of our service to the end user. This means that expert overview and supervision from our factory is constantly available because of access

via the internet; any modifications to the software programme, if needed, can be done off site and uploaded via the internet. This is why we recommend the use of a separate IP address for the Protek BMS PC so this expert overview does not compromise the client's BMS security. We don't need to go in to their premises, we don't need to disturb the tenants, everything is diagnosed and remedied remotely.

IGS: There was a study carried out by the Uni. of Cambridge that studied a number of Key Parameter Indicators or KPI's for your system. What were these KPI's.

Jackie: We wanted to establish the actual energy consumption of an installed system to ensure it backed up our design calculations.

While the Cambridge University report does not specifically set out KPI's in any detail, the following KPI's were informally used to measure performance.

- Achieve Carbon Dioxide levels to ASHRAE Standard maximum of 100ppm or lower.
- Energy Consumption compared with actual against design, measured on a monthly basis.
- Energy Consumption of System Components monitored making use of time log graphs of room temperature and carbon dioxide levels.
- Achieve System Temperature Control to ASHRAE standards.
- Comparison of performance with standard VAV, Fan Coil Air Conditioning Applications.

- Improve Air quality using ASHRAE guidelines
- Reduce Sound Levels set out in ASHRAE Guidelines.
- Ventilation Air Flow measured against ASHRAE standards.
- Reduce Carbon Footprint of 2.25 tonnes of office emissions per year per employee from the workplace.
- Reduce Whole life cycle cost compared with conventional A/C Systems.

The study was carried out over an 8 month period and the report showed the Protek system uses 52% less carbon emissions than a conventional VAV overhead system. In comparison to some overhead VAV systems, the Protek system used 71% less energy.

IGS: It obviously depends on the size (square footage) of the space involved but for an average sized space, how long would it take to design and fit an average system (if there is such a thing).

Jackie: The cost obviously depends on whether the client chooses Protek's total integrated system or merely parts of the system. What we prefer to do is to get clients to send us a floor plan, together with the estimated cooling load, and we will choose the appropriate units, suggest the positions for siting the units and provide a budget cost. We prefer to get involved as early as possible in the design of a building because we can make many cost saving suggestions for the client. Protek has the expertise to assist at all stages of design and installation.

IGS: Recently there have been a number of dissenting voices, high profile architects speaking out against things like LEED and BREEAM certification which they say does not do as it says on the tin. The RIBA have proposed new legislation that will compel the disclosure of a building's (or a system's) energy consumption. Presumably this would put Protek in a strong position and is something you would welcome.

Jackie: Well LEED and BREEAM have performed a useful service in that they highlighted the need to identify, list and weight the importance of key elements in a building's design and construction; and provide a benchmark as it were. And now as we improve our knowledge of how buildings

work once they are tenanted, and change our ideas about the importance of energy efficiency and carbon emissions, etc., then obviously we are going to need to review and change these key parameters. So basically, I would expect LEED and BREEAM need to evolve to reflect the community's increasing awareness and demands for better buildings.

For example, in Abu Dhabi, the UPC has initiated ESTIDAMA, to promote sustainability in building design and community development; and there is a big emphasis on water conservation in their program. But, yes it's one thing to design a system and make claims for its energy consumption, and quite another thing to deliver up a finished product which performs as designed. That's why Protek places a big emphasis on its integrated system and particularly the BMS portion; because it enables us to monitor the performance of the system after the building has been completed and the tenants have moved in. And during the warranty period we optimise the energy performance by understanding how the building is working 24 hours a day. Ultimately the knowledge we gain, have gained and continue to gain by working with

our completed projects enables us to improve our design.

IGS: It seems to me that a system like this is absolutely ideal for hot and humid climates. Are you actively targeting specific markets?

Jackie: We are targeting a number of key markets, including Korea. We have found in Korea that our clients, who are the building owners themselves, want to provide good indoor environments for their staff. At the same time, these modern companies employ young people where digital communications and social media are rapidly changing the shape of the office. This "freeform" style of office needs a flexible HVAC system which nevertheless can provide good ventilation and cooling for high density usage, in Korea 1 person per 5m² is standard. Throw in an outdoor temperature range of -10oC in winter through to +40oC in summer and many normal HVAC systems cannot cope. Additionally, the Korean legislators are making energy efficiency and low carbon emissions a high priority and so this makes it an ideal market for the Protek underfloor air conditioning system. We have also found that

Korean construction companies appreciate the up front cost savings they can make by using Protek.

IGS: What's next for the company? What new developments are appearing on the horizon?

Jackie: We will continue to work on optimising the coordination of ventilation, air conditioning and energy consumption by reducing the pressure in the fans and resistance in the system. We will also focus on improving the indoor air environment and climate by using environmental sensors as well as temperature sensors. Our next step will be to utilise the façade and roof areas to store energy, collected when available free in order to optimise energy efficiency. The storage facility will be able to store the energy for 24-48 hours and be used when needed in the building.

Whilst the Protek system is already a unique innovation, investments are constantly being made into R&D to move the product further ahead. IGS predicts this as one to watch in the immediate future and in time to come.



Protek facilitates a flexible office layout