

Pre-commission cleaning 'essential'

Darren Ling, a director of ventilation and kitchen extract duct cleaning specialist System Hygienics, explains why pre-commission cleaning is essential to combating the risk of healthcare-associated infections (HCAs).

According to recent data published by Health Protection Scotland, cases of *Clostridium difficile* among the over 65s in Scotland, and cases of Methicillin-resistant *Staphylococcus aureus* (MRSA), are at their lowest since records began. Health Protection Agency annual figures published in July 2010, meanwhile, revealed that the number of *C. difficile* and MRSA cases in England and Wales fell by a third compared with the previous year. This is, however, no time for complacency, since these reductions have been achieved by many hospitals across the UK taking a hard line when it comes to healthcare-associated infections (HCAs). The decreases point to good housekeeping measures controlling the spread of these diseases, rather than any significant reduction in the threat of the infections themselves.

Key to controlling the spread of HCAs is ensuring good indoor air quality. To achieve this, a hospital needs to have a clean ventilation system, including clean ductwork. With research proving a link between the spread of HCAs and uncleaned ventilation systems, it is essential to remove this risk. To control the spread of infections, ductwork's internal surfaces must be cleaned regularly. If not, there will be a build-up of dust and dirt – a mixture of organic compounds including a high proportion of skin and hair – which are valuable nutrients for microorganisms. These can easily become airborne and thus transmit to patients.

The Department of Health's Health Technical Memorandum (HTM) 03-01 – "Specialised Ventilation in Healthcare Premises" addresses patient comfort and the prevention and control of HCAs, offering guidance on how hospitals can comply with their duty of care towards patients, staff, and visitors, to meet their legal requirements. The document

considers functional responsibilities and minimum requirements for ventilation systems, and advises on annual inspection procedure and verification requirements, as well as addressing issues associated with inspection and maintenance.

Increased risk to patients

The introduction page of HTM 03-01 states: "Increased health risks to patients will occur if ventilation systems do not achieve and maintain the required standards. The link between surgical site infection and theatre air quality has been well established.

"If the ventilation plant has been installed to dilute or contain harmful substances, its failure may expose people

Protection of ductwork on a construction site will not guarantee internal cleanliness of ductwork



Darren Ling.

to unacceptable levels of contamination. Proven breaches of the statutory requirements can result in prosecution and may also give rise to a civil suit against the operators."

Although regular cleaning of a building's ventilation system is essential for maintaining safe, comfortable, and efficient working conditions, it is not just ventilation in operational buildings that needs to be kept clean. It has long been a myth that protection of ductwork on a construction site is sufficient for maintaining the internal cleanliness of the system in a new building. This is not true.

The Heating and Ventilating Contractors' Association's *TR/19 Guide to Good Practice, Internal Cleanliness of Ventilation Systems*, stipulates: "Protection of



The site of the new Peterborough City Hospital, where System Hygienics recently completed a major pre-commission clean.



Ventilation ductwork before and after the pre-commission clean.

ductwork on a construction site will not guarantee internal cleanliness of ductwork. Where specific verifiable levels of internal cleanliness are required, it will be the responsibility of the designer to specify the inclusion of a specialist cleaning contractor on the outset of a contract to internally clean newly installed ductwork just prior to commissioning work commencing."

Taking responsibility

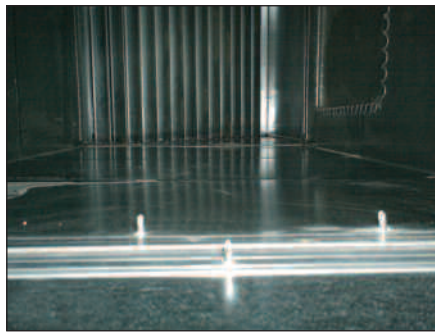
In the past, there have been issues over whose responsibility it is to maintain a suitable working environment to prevent newly installed ductwork from becoming contaminated. It is the responsibility of the specifier to assess the acceptable risk of contamination, and to select and state clearly, in the invitation to tender, the level of protection required for the ductwork and the requirement for specialist cleaning.

Despite the best efforts to protect ductwork from contamination on a construction site, it is impossible to guarantee that the ventilation system will remain clean in such a dusty environment. Extract systems are quite often left running during construction projects to remove the dust from the working environment generated by builders brushing up, sanding walls, constructing floors etc. As a result, dust is picked up by the extract system and deposited in the ductwork. The dust, in combination with the heat and humidity of the ventilation system, become the ideal breeding ground for germs. Cultures can grow in the dust of a dirty system and travel round the extract system.

Establishing a 'baseline'

Pre-commission cleaning is therefore vital to ensure that a building's ventilation system is uncontaminated from the start. This is even more important in a hospital environment. Before beginning a pre-commission clean it is essential to survey the ventilation system to establish a baseline. After the cleaning, a second survey needs to be undertaken to ensure that the ductwork has been cleaned to recommended levels.

A common problem in the pre-commission cleaning of new ductwork is that some contractors are using tests



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specified for measuring ductwork cleanliness in existing buildings to evaluate the same properties in new buildings. As a result, new buildings are being handed over with ductwork that does not meet the recommended levels of cleanliness.

There are three levels of care and protection set out in the HVCA's TR/19 document for maintaining the internal cleanliness of new ductwork prior to commissioning and/or handover – protection, delivery, and installation (PDI) Levels 1, 2, and 3.

Pre-commission cleaning recommendations

PDI Level 3 highlights the benefits of specifying a specialist cleaning contractor to internally examine and clean newly installed ductwork. This part of TR/19 includes:

- Advice on the number of cleaning access panels to suit the method of cleaning.
- Clear direction on the size and location of cleaning access panels to be installed.
- Verification of the practical access requirements for a regular cleaning maintenance programme.

- Confirmation of the cleanliness of the installation by means of a post-clean report.

Verification must take place immediately after cleaning to avoid post-clean interference by means of a vacuum test (VT) based on the recommendations of the HVCA's TR/19.

A system will be considered acceptably cleaned if a result of no more than 0.075 g/m² is achieved, equivalent to 0.75 mg/100 cm² as per the HVCA's TR/19. This applies for specialist pre-commission cleaning of new systems, and should not be confused with surface deposit limits, which determine dirtiness levels in existing buildings – commonly 6 g/m² for extract systems and 1 g/m² for recirculation systems and supply systems.

Following the tests, a completion report is issued highlighting the type of tests performed, the results, photographic support, and future recommendations on maintaining the cleanliness of ductwork.

Cleaning the new Peterborough City Hospital

System Hygienics has more than 15 years' experience of cleaning ductwork systems for NHS and private hospitals, and recently completed a major pre-commission clean at the site of the new Peterborough City Hospital, working with contractor Mercury Engineering. This £335 million new hospital, built by Brookfield Construction (UK), opened last November, and replaced the Peterborough District Hospital, Edith Cavell Hospital, and Peterborough Maternity Unit. The 612-bed, four-storey hospital offers a full range of specialities, including an oncology unit, expanded cardiac services, a dedicated women and children's unit, and a sophisticated emergency centre. The City Hospital therefore offers services for patients not previously available in Peterborough, such as radiotherapy. This means that some cancer patients will no longer have to make the journey to neighbouring hospitals for treatment.

Mike Sharples, project director from Brookfield Construction (UK), said: "This project is one of the biggest healthcare initiatives in the UK, and the largest



The ventilation system serves the entire 96,000 m² hospital building at the new Peterborough City Hospital, including intensive care units (ICUs), theatres, wards, technical rooms, canteens, and cleaning cupboards.



The 612-bed, four-storey, £335 m new hospital is the largest building project in Peterborough for over 800 years.

building project in Peterborough for over 800 years. The hospital is a landmark building, and demonstrates a good working relationship between the client, the Trusts, the design team, and contractors like System Hygienics."

System Hygienics' brief for the project was to pre-commission clean the hospital's ventilation systems to meet the HVCA's TR/19 standards before the project's completion date to allow time for commissioning. The 96,000 m² hospital, with over 4,000 rooms, includes state-of-the-art facilities, with ventilation systems serving the entire building, including intensive care units (ICUs); theatres; wards; technical rooms; canteens, and cleaning cupboards. The pre-commission clean included work on the *in situ* ductwork, the air handling units (AHUs), the coils, and the ceiling grilles.

A 'huge' site

Due to the project's scale, System Hygienics appointed a minimum of three operatives to be present on site at all times throughout the cleaning project, which increased to eight operatives during busy periods. Covering a huge site with twelve individual plant rooms and a significant amount of AHUs, the project took five months, starting last May and

finishing in October, before the hospital's opening in November.

The hospital's ventilation ductwork was cleaned using System Hygienics' remote cleaning method, the Jetvent system, which uses compressed air and a powerful high efficiency filtered extraction unit to achieve a fast, effective clean to the HVCA's TR/19 standards. As a result, the system thoroughly cleans the ductwork, but also ensures that contractors meet completion dates.

The Jetvent compressed air system is a much more efficient way of cleaning ductwork than other brush cleaning systems. Fewer access doors are needed, and the Jetvent system hose drives through the ductwork, blasting the dust into the powerful extract airflow and following the form of the ductwork, whether square, flat, or oval, ensuring that all surfaces – including the corners – are clean. Requiring just a 25 mm access hole, the Jetvent can reach up to 50 metres from any access point.

At Peterborough City Hospital, with most of the ductwork already featuring access doors, the System Hygienics team only had to create 20 such access points in the ventilation systems on the whole site – to take samples from the ductwork before and after cleaning. Generally, hospitals direct the pre-commission cleaning team to take samples from areas such as ICU and theatres where HCAIs could pose a high risk to patients.

Health and safety issues

Although there were no significant technical challenges when it came to pre-commission cleaning Peterborough City Hospital's ventilation systems, health and safety was a significant issue on the site. The compressed air system hoses needed to run through the building, so it was necessary for the System Hygienics team to send plans of the hose routes for approval two weeks before the pre-commission cleaning began to ensure that the proposed routes were compliant and safe. To reduce the health and safety risks, hoses were clipped to handrails

Darren Ling

Darren Ling has worked for System Hygienics for 12 years. Having joined the company as a junior sales engineer, his success in customer relations and sales roles saw him given the position of sales manager. Four years ago he was promoted to director of sales and marketing, and is now responsible for a team of six sales engineers.

During his time with System Hygienics, Darren Ling has played a significant role in expanding the company's cleaning services, to include ventilation duct cleaning, kitchen extract duct cleaning, infection control in hospitals, cleanliness risk surveys, fire damper testing, and rubbish chute cleaning.

System Hygienics is a member of the Hotchkiss Group of companies founded in 1885, which provide specialist services in ductwork contracting, fire-resistant ductwork coatings, and a variety of ventilation and acoustic products and accessories.

where possible to avoid trip hazards.

System Hygienics provided detailed reports, with "before and after" photos of all aspects of the ventilation systems, along with a certificate of cleanliness, and third party-analysed HVCA TR/19 vacuum tests, to verify the high level of cleanliness achieved.

Pre-commission cleaning is, of course, only the first step in maintaining a clean and healthy ventilation system. To prevent the spread of HCAIs, regular cleaning and maintenance of ventilation systems is key. The Health Technical Memorandum advises that all ventilation systems should be subject to at least a visual inspection annually, but, with hospitals taking a hard line on HCAIs, it is wise to survey ventilation systems more regularly than that. High-risk areas, such as ICUs, may require a survey every quarter. +