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### **Integrated solutions for efficient, safe and secure clean rooms and laboratories**

**Clean rooms and laboratories are challenging environments, especially when attempting to optimize operating costs. The investment that lies behind the processes that they represent is usually very significant in terms of both money and time. The assets that clean rooms and laboratories house, both human and material, are significant. These workplaces serve highly regulated markets yet the potential for danger is often ever-present in the form of high-risk substances and processes, contamination, fire or explosion.**

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It is therefore not surprising that intelligent building technology solutions are now used to minimize risks, increase efficiency and ensure verifiable compliance with all relevant regulations. They integrate all areas of building technology to control and monitor clean rooms and laboratories, thus providing convenience and safety for employees, protection of personnel, processes and the environment; safe and energy-efficient operation; prevention of contamination; upgrade migration and flexibility; as well as consistent manufacturing standards and regulatory compliance.

### **Security of sensitive workplaces**

The sort of assets that clean rooms and laboratories might house can include raw materials, intellectual property and valuable finished products. The use of a security solution that integrates access control with video surveillance can overcome the problems of unauthorized entry and thereby reduce the possibility of contamination by tampering, piracy and theft. Access control solutions are especially suited to the security of life science environments because of the capability of offering many different levels of access and clearance to different personnel. The access control system, when combined within an intelligent building management system, can be utilized to realize additional benefits. Demand-controlled lighting and ventilation can easily be achieved through the use of normal occupancy detectors but with access control functionality, they can be used to further improve heating and lighting efficiency.

It is even possible to determine comfort levels within a room based on the details of any one person that has entered. If that person is a cleaner carrying out active, physical work, for example, the system might set the temperature at a lower level than for a sedentary chemist or technician, but with an increased rate of air exchange. This results not only in greater comfort for the occupant but also greater energy efficiency.

### **Integrated fire detection and building systems**

Often in science facilities, the substances used and the processes undertaken – some of which result in the production of large clouds of dust – necessitate dedicated fire detection systems. Typical causes of fires in these applications include short-circuits, spontaneous combustion of deposits within air ducts, for instance, or leakage of easily flammable liquids and gases. Fire and smoke damage can cause loss of products, equipment and assets representing significant financial losses within minutes. At the same time the high air flow can also cause contamination of sensitive equipment that might then need to be replaced. Resulting downtime in production would also have a very significant financial impact. For early and reliable detection of increased fire variables, specific solutions are available for monitoring and regulating climate control installations in explosion zones as well as dedicated fire safety solutions. These include certified smoke, heat and flame detectors for explosion-risk zones.

In laboratories, technicians often use open flames as a source of heat. This significantly increases the risk of the outbreak of fire within the fume hood under which they are working. Systems specifically developed to protect fume hoods typically employ linear fire detection technology and are designed to detect the onset of combustion within seconds. They usually offer automatic extinguishing. The integration of such systems with a management system facilitates the monitoring of the operational conditions within the fume hoods and the pressure of the extinguishing medium.

When fire detection systems are integrated with building management and control systems, a much clearer overview is possible and opportunities arise to automate even more processes. In an emergency situation, this can prove invaluable. In the case of concentration levels of toxic gases increasing, for instance, extraction levels of the ventilation system might be automatically set up to accelerate the dissipation of harmful fumes. If fire is detected, window blinds might be automatically lifted to increase visibility and facilitate access by the emergency services. Evacuation systems, so vital in swiftly and efficiently communicating clear and concise instructions to those affected in an emergency and thus important in alleviating panic, can also be integrated

within any overall building management solution. Voice-based messaging emanating from a well-informed control point can prove particularly invaluable in an emergency situation.

### **Energy-efficient working conditions**

Today's building technology means that clean rooms and laboratories can offer state-of-the-art scientific workspace. Additionally, facilities equipped with optimum technology can also provide the opportunity to save energy, with integrated building management solutions playing the key role. An integrated approach can ensure regulatory compliance whilst reducing lifecycle costs. It does so by allowing the control system to adapt heating, cooling and fan output, as well as lighting, to the actual need at any time. As a rule, plants for clean rooms and laboratories are designed for maximum operation. That is, they are geared to supply air for when the fume hood sash panel is fully open – a situation that rarely happens.

Also, with 65 percent of energy costs attributable to HVAC systems, it is possible to bring about economies by adopting GMP monitoring integrated with the HVAC controls. Integrating particle counters into the HVAC system and varying air-change rates based on the level of airborne particulates detected, can further optimize energy usage whilst still ensuring control of room cleanliness.

### **Validation of conditions**

Environmental conditions in life science facilities are influenced by ventilation systems that can have a considerable effect on product quality. To protect public health and security in these facilities, Asian, European and American authorities therefore define measures that require documented proof that temperature, humidity, air pressure and particle measurements are audited in such a way that they cannot be manipulated. There is currently an increasing trend toward independent, risk-based monitoring systems. In accordance with the predicate guidelines of the life science industry, only those parameters of a system that are rated as actually GMP relevant by an influence analysis must be validated. This approach creates a considerable reduction in costs for the monitoring system and its validation.

Siemens CMT (Compact Monitoring Technology) is a standardized solution, designed to deliver everything needed for GMP compliance. It can be tailored to individual needs. Since it is pre-engineered, pre-installed and pre-tested, Siemens CMT cuts installation costs and risks in providing validated monitoring. Developed on a risk-based approach utilizing standard technologies, CMT continuously monitors up to 100 relevant, GMP critical parameters via precise, certified sensors. It measures all process-critical and quality-relevant environmental parameters such as temperature, humidity, particle counters, air pressure and velocity as well as controlling

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access to sensitive equipment or restricted areas. When monitored systems approach pre-specified maximum or minimum values, an alarm is immediately triggered. The system even has a built-in sensor warning that indicates when the sensors need to be re-calibrated. CMT records all relevant parameters on an hourly, daily and weekly basis to comply with regulations and stores them in a tamper-proof manner. It also provides secure back-up and archiving functions as well as safe and easy access to data. Moreover, its scalability means that the CMT solution from Siemens can be adapted to grow with an installation's needs.

### **Benefits of integration**

Intelligent building management of clean rooms and laboratories is about maximizing the use of information. By integrating data from fire and gas detection systems, video surveillance, access control systems, lab rooms and fume hoods along with that of heating, ventilating and air-conditioning and other automated building systems such as elevators, escalators, water treatment systems, laboratory and medical technology systems, significant benefits can be achieved. Integration reduces complexity by providing one user interface for the infrastructure of the entire building. Each subsystem operates autonomously, with the overall solution only displaying information needed for any particular task. In the event of any deviation from normal operating conditions, it is immediately indicated visually and acoustically on the control panel and users are guided intuitively to its cause and through any steps that might be necessary to rectify the situation.

Most importantly costs are cut both short-term and long-term, as the clean room or laboratory is secure, energy efficient and – with CMT from Siemens – fully compliant.

### **Siemens at Lounges 2013**

Siemens will be exhibiting at Lounges 2013, one of the largest hygienic process environment sector trade events in Germany, from 5th to 7th of February, at Messe Karlsruhe. Siemens will be promoting the complete portfolio of its Building Technologies Division. This includes solutions for the life science industry covering all aspects, from the planning phase to building maintenance. During the course of the exhibition, Siemens personnel will also be speaking on topics such as security and safety in clean rooms; GMP compliant particle monitoring; energy optimization, and, of course, the many real possibilities afforded by integration.

The **Siemens Infrastructure & Cities Sector** (Munich, Germany), with approximately 90,000 employees, focuses on sustainable technologies for metropolitan areas and their infrastructures. Its offering includes products, systems and solutions for intelligent traffic management, rail-bound transportation, smart grids, energy efficient buildings, and safety and security. The Sector comprises the divisions Building Technologies, Low and Medium Voltage, Mobility and Logistics, Rail Systems and Smart Grid. For more information, visit <http://www.siemens.com/infrastructure-cities>

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