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Benuzzi's Industrial Guide

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Building Evolution: The Next Generation of Industrial Facilities

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Today's industrial facilities represent a variety of users, and technology is utilized in a wide range of capacities throughout each unique building. As business standards evolve and technology advances, the need for better equipped and "smarter" facilities will continually arise. Construction firms are tasked with accurately constructing the building to meet the tenant's latest or changing technology requirements.

Carefully crafted Methods of Procedure (MOPS) are prepared and implemented by the contractor to ensure that each requirement is built correctly due to the intricacies involved in constructing a technologically advanced facility. Additionally, in the case of working within currently occupied and operating facilities, extensive plans are prepared in case of any system failure – during and after construction – to make certain that valuable data is not lost and that the facility can continue operations until it is restored to full capacity.

There are countless technology-rich components that today's industrial users are seeking to add to an existing building or build-to-suit environment. Many of these enhancements include increased HVAC capacity, energy management systems, advanced fire protection methods, structural enhancements, increased fiber optic abilities and improved security measures.

Cool Down

Technology is typically supported by an assortment of computers and machinery. Highly advanced facilities, such as data centers, utilize multiple pieces of equipment to constantly back-up important company data at off-site locations. These machines generate heat as they work, necessitating a more powerful and around-the-clock cooling system to prevent over heating. Computer Room Air Conditioners (CRAC) are specialized units designed specifically for IT environments and are often installed within industrial settings that support this type of process. It is critical to select the right size CRAC units for the space - units that are too small will not cool effectively and over-sizing can cause the machines to cycle on and off, forcing them to work harder. This not only creates an inconsistent room temperature but also decreases the life-cycle of the product.

The installation of a back-up generator is also becoming more common to keep a facility running automatically through a power failure. Back-up generators can be located indoors or outside a facility and are designed to automatically or manually generate power. Some buildings, such as hospitals, large banking centers, air traffic control towers and data centers, are supported by a back-up to the back-up generator to establish an extra layer of protection.

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Energy Management Systems (EMS)

Commercial buildings in the U.S. are estimated to total approximately 70 billion square feet representing over 20% of the energy consumption used annually within the United States. The growth of Energy Management Systems (EMS) is representative of the need to manage the nation's interest in a 24/7 society yet provide a highly cost effective solution for energy efficiencies and reduced operating costs. EMS systems are primarily focused on heating, cooling, ventilation, and lighting – components that represent over 57% of the energy consumed within a commercial building. The new generation of EMS systems is a combination of building management systems and advanced software solutions that work together to manage the functions within the building in a much more energy efficient manner. The variety of energy efficiency applications and the integration of EMS systems into existing building systems is growing at a remarkable pace increasing the market for these products to over \$6.3 billion by 2020.

Fire Protection

Today's facilities must accommodate for a variety of challenges, and a building fire is no exception. A fire in a highly technical area must be contained without the use of water to avoid complete damage to equipment and subsequent loss of data. A highly specialized chemical mixture known as FM200 is utilized for fire suppression within IT areas and other highly-sensitive environments. FM200 dispensers, like traditional sprinklers, are heat activated. Additional precautionary measures include Very Early Smoke Detection Apparatus (VESDA) smoke detectors, which sense smoke earlier and more accurately than traditional systems.

The incorporation of fire stop materials is also crucial to containing damage. These materials, which are applied to door and window frames and other openings, act to expand like a marshmallow under fire conditions to block and prevent the fire and smoke from spreading.

Early Suppression Fast Response (ESFR) sprinklers are a more established method of fire suppression and are commonly utilized within industrial facilities. An ESFR sprinkler system is located within the ceiling structure and can offer better fire protection than the more costly in-rack systems. ESFR sprinkler heads sense a fire and begin spraying water in half the time of conventional heads, releasing approximately 100 gallons of water per minute (gpm), compared to conventional sprinklers that release about 60 gpm.

Structural Enhancements

The unpredictability of Midwestern weather and geological conditions necessitates a practical approach to securing a highly advanced industrial facility. Many building owners are installing reinforced structural bracing to accommodate the environmental impacts of the earth and weather. Seismic bracing protects against the rare but very real chance of an Illinois earthquake.

A building is traditionally designed to withstand vertical loads (the weight of the building itself). However, most buildings in the Midwest are not designed to accommodate the horizontal force that is applied by an earthquake. Seismic restraints resist the horizontal forces and keep the building systems in place and secure. The main purpose of seismic bracing is to keep workers safe and to minimize building damage from an earthquake.

The earthquake that occurred in Illinois on April 18, 2008 was one of the largest ever recorded within this area, measuring 5.4 in magnitude. The epicenter was in Mount Carmel, Illinois, located in the Southeastern part of the state, but the effects could be felt as far south as Atlanta, Georgia and as far north as the Upper Peninsula of Michigan. Seismic mitigation protects the sensitive and expensive equipment that is commonly installed in today's industrial facilities during ground vibration events such as this.

Structural reinforcement can also protect against extreme weather, such as tornados. The reinforced structure of the facility allows its walls and roof to withstand fierce wind loads and also shields the building from collapse.

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Fiber Optics

The use of fiber optics to transmit data provides the ability to broadcast more data over longer distances at higher bandwidths, and many facilities are incorporating this important capability. For short distance applications, such as creating an in-building network, fiber-optic cabling can be used to save space in cable ducts. This is because a single fiber can often carry much more data than multiple electrical cables. Today's industrial and distribution facilities utilize fiber optic systems for sophisticated order fulfillment operations and inventory maintenance, among other functions.

When installing or accommodating for fiber optics, contractors must consider whether there is a need for future fiber optic space and how to protect existing fiber optics during construction. Detailed coordination between the tenant, the utility company, architect and contractor is crucial to creating the necessary space within the server room and ensuring that the correct amount of fiber optics are provided.

Security Measures

The large amount of important data and advanced systems that are stored within these modern industrial facilities necessitate additional protection of the valuable intellectual property that is processed and accumulated on-site. Elaborate security measures are often implemented, including extensive video surveillance and the establishment of restricted areas. The contractor must also account for the installation of the hardware and associated electrical support for such measures.

Traditional security criterion, such as card readers, perimeter fencing and a human security presence are typically in place. However, the need to secure these facilities also extends to the project team during the construction phase - from the lead project manager to each subcontractor tradesman. Detailed plans are drafted and followed that prevent access to the secured portions of the facility, outline procedures for protecting existing equipment and require detailed record keeping of the parties entering and exiting the building.

High-Tech Construction

Executing the construction of a high-tech facility requires the incorporation of additional components beyond more traditional industrial environments. Contractors have the ability to meet the advanced technology components that many of today's clients require, including increased HVAC capacity, energy management systems, advanced fire protection methods, structural enhancements, amplified fiber optic abilities and security considerations.

Despite economic conditions affecting the overall construction market, many companies within the technology field are currently experiencing growth. Additionally, professional services firms and other types of similar companies cannot risk compromising data storage and transmission capabilities in an effort to cut overhead. The expansion and upgrade of new and existing facilities creates opportunities that skilled and experienced general contractors can maximize in today's environment.

The successful completion of a technology-supported industrial facility requires an experienced contractor, like McShane Construction, that can carefully consider each detail and provide clear communication and direction throughout every phase of construction.

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