



OPTIMIZING FACILITY MANAGEMENT WITH HIGH-PERFORMANCE COATINGS

Correct Coatings Choices Are a Cornerstone of Maximizing Performance and Safety.

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Correct Coatings Choices Are a Cornerstone of Maximizing Performance and Safety.

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In manufacturing and processing industries, facility managers play a central role in ensuring smooth operations. They are tasked with maintaining functional systems, meeting regulatory standards, and providing a safe and productive environment. One of the key tools at their disposal is the use of advanced protective coatings.

These coatings are more than just a layer of protection – they can enhance the durability and efficiency of a facility's operations and infrastructure. By strategically applying high-performance coatings to floors, walls, steel and other surfaces, facility managers can mitigate wear and tear, reduce maintenance costs, and extend the lifespan of their assets and facilities (Figure 1). This proactive approach not only supports regulatory compliance but also promotes a safer and more efficient working environment.

A key component of enhancing maintenance, cleanliness and safety is the application of the appropriate advanced protective coatings in corresponding places throughout a

facility. Properly specified coatings can greatly increase the durability and efficiency of operations and infrastructure and promote long-term stability and success.

DESIGNING DURABLE SPACES

Manufacturing and production areas typically encompass large, open spaces that must be carefully designed and maintained.

The nature and utility of these environments demand robust flooring – in addition to wall and steel coating systems – that can withstand rigorous use while maintaining a high standard of safety and quality.

Flooring must be tailored to the expected activities and traffic. For instance, areas exposed to foot traffic and rubber wheeled carts may require a moderate-duty, three-coat system (approximately 20-40 mils). However, areas subjected to heavy forklift traffic or other heavy machinery may need a heartier solution, such as a five-coat epoxy mortar system (approx. 250 mils) (Figure 2).



Figure 1. High-performance coatings applied strategically to floors, walls and steel structures in manufacturing and production areas can help mitigate wear and tear; reduce maintenance costs; extend facility asset life cycles; support regulatory compliance; and promote safer, more efficient working environments.



Figure 2. Robust floor, wall and steel coating systems are required in manufacturing, production and storage areas to withstand rigorous use while maintaining a high standard of safety and quality.

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These considerations are also important when it comes to flooring systems for new or smooth concrete slabs, versus an existing, older, eroded or pitted slab that may require resurfacing.

Additionally, flooring system topcoats must exhibit chemical resistance properties in manufacturing areas due to various chemicals and solvents that could spill during operations – qualities that reduce maintenance requirements and extend longevity.

Slip resistance is a key consideration. Floors must have the appropriate texture to prevent slips and falls, which account for a significant number of workplace injuries. In 2021, according to the Bureau of Labor Statistics, 18% of all nonfatal work injuries resulting in days away from work were from slips, trips and falls. As part of a company-wide safety program, flooring with suitable surface traction can help facility managers meet operational goals. The correct use of safety colors and floor marking provides visual cues to help prevent these accidents as well.

Light-reflective floor finishes can enhance the overall brightness of the area. The amplified room illumination can increase visibility, contributing to a safer work environment and improved production outcomes.

Walls and ceilings in manufacturing and production areas require special attention. Bright walls and ceilings create a well-lit environment, potentially reducing the need for additional lighting fixtures and improving energy efficiency. These coatings can also contribute to a cleaner and more professional appearance, which is important for areas frequently visited by customers or subject to audits.

Steel structures need protection against corrosion, which aids in structural integrity and longevity. Simply painting steel surfaces is often insufficient for the harsh conditions frequently found in manufacturing and production environments. Advanced protective coatings are therefore required to sufficiently shield steel from the corrosive effects of moisture, chemicals and other factors.

Maintaining manufacturing and production areas is a complex task for facility managers. A comprehensive strategy for proactive maintenance is essential, including setting inspection schedules, recognizing signs of wear, implementing preventive measures and preparing ready-to-go repair strategies to quickly address any surface issues.

The number of choices can be daunting, but experienced coatings specialists can provide valuable support, allowing managers to focus on other critical operations.

WET AND DRY CONSIDERATIONS

Wet and dry processing areas – especially in the food and beverage industry – present unique challenges.

Due to their distinct operational requirements and conditions, these areas require specific maintenance and protective measures to maintain the integrity of processes, the safety of the products and compliance with health regulations.

In dry processing areas, controlling temperature and humidity promotes the proper handling and processing of food products. The flooring systems in these areas must be impervious to moisture to prevent contamination and remain durable. Resinous flooring systems are ideal for these environments as they provide a seamless, nonporous surface that resists moisture infiltration and maintains integrity, even at varying temperatures. These systems also offer the necessary hardness and strength to withstand mechanical stresses and the high temperatures typical of dry processing.

On the other hand, wet processing areas frequently use water for processing – which requires flooring systems to be highly resistant to constant moisture exposure and aggressive cleaning protocols (Figure 3). Wet environments benefit from resinous flooring systems with textured finishes that enhance slip resistance, reducing the risk of slips and falls. The flooring in wet



Figure 3. Wet processing areas require flooring systems that are highly resistant to constant moisture exposure and aggressive cleaning protocols. Such systems often feature textured finishes to enhance slip resistance and reduce the risk of slips and falls.

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areas must also be impervious to cleaning agents, process-related chemicals and other liquids to help support long-term performance and minimized maintenance needs.

Walls in both wet and dry processing areas require advanced protective coatings that can withstand the unique challenges of each environment. In dry processing areas, wall coatings must prevent moisture infiltration while providing a durable surface that can resist common impacts and abrasions. These coatings also help maintain a hygienic environment by preventing the buildup of contaminants and allowing for easy cleaning.

In wet processing areas, wall coatings need to be even more resilient. They must endure constant moisture, aggressive cleaning procedures and chemical exposure. Advanced protective coatings allow walls to be properly and efficiently sanitized for food safety. These coatings can also help prevent the growth of mold and mildew – a significant concern in consistently damp environments.

Steel surfaces in processing areas are also susceptible to damage from moisture and chemicals. In dry processing areas, steel components need coatings that can withstand temperature variations and resist corrosion. Protective coatings provide a barrier against environmental factors that could compromise the structural integrity of these elements.

In wet processing environments, the challenge is even greater. Steel surfaces must be protected from regular water exposure and chemical agents used in processing and cleaning. Advanced anti-corrosion coatings are essential to prevent rust and degradation.

FORTIFYING SURFACE PROTECTION IN CHEMICAL ZONES

Chemical processing and storage areas are among the most demanding environments within any facility. These areas are often regularly exposed to harsh chemicals, solvents and acids, as well as heavy loads and high traffic. Maintaining the integrity and safety of these environments can help prevent accidents, maintain operational efficiency and protect a facility's infrastructure.

Flooring must be exceptionally resilient, and resinous systems designed to withstand exposure to different types and concentrations of chemicals are available. These systems provide a durable, nonporous surface that resists vapor, splashes and spillage of - and immersion in - various aggressive acids, alkalis and solvents. Properly installed resinous floors bond aggressively to the substrate, offering long-term protection against chemical attacks and mechanical damage.

Secondary containment areas, designed to capture and contain spills, require even stronger solutions. Lining systems for these areas must be able to resist caustic chemicals to prevent leakage that could lead to environmental contamination or safety hazards. The linings must be seamless and impermeable, with no weak points where chemicals can collect.

The tanks used in chemical processing and storage are continuously exposed to harsh chemicals and often need specialized linings to protect both the tank and its contents. Solvent and acid-resistant coatings are essential for these applications. These linings help protect the tank from corrosion and chemical degradation as well as help prevent contamination of stored materials. The linings must adhere well to the tank's surface, providing a long-lasting barrier that can withstand the rigors of long-term exposure.

The structural steel surfaces in facilities can also face significant risks of corrosion and abrasion due to exposure to chemicals and mechanical wear. Advanced anti-corrosion coatings can extend the usable life of these structures. The cured finishes form a dependable barrier and reduce the need for frequent maintenance and replacements, allowing operations to continue uninterrupted.

In addition to consulting coatings experts, facility managers can work with installers or applicators who can react quickly when unplanned shutdowns occur. Partnering with manufacturers who can provide available products on short notice can also help accommodate compressed shutdown timelines.

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SAFETY AND STERILITY IN R&D

While traditional commercial paint and coatings are ideal for many environments, they are generally not suitable for Research and Development laboratories and cleanrooms due to their lack of durability and resistance to the demanding conditions of these environments. These traditional light-duty solutions are also more likely to require frequent repairs and replacements, which can disrupt operations and compromise the integrity of the cleanroom.

R&D laboratories and cleanrooms are critical environments where the highest standards of cleanliness, sterility and environmental control are a central focus. The right coatings – carefully selected and applied – help safeguard these environments, protecting both the integrity of these spaces and the valuable work conducted within them.

Resinous flooring systems are ideal for such settings due to their seamless nature, eliminating joints or cracks where contaminants can accumulate. These floors provide nonporous surfaces that can withstand the rigorous cleaning and sanitizing procedures necessary to help control a sterile environment. The durability of resinous flooring also means these systems can handle heavy traffic.

Flooring in many types of cleanrooms requires electrostatic dissipative (ESD) properties to prevent static discharge, which can damage sensitive electronic components, disrupt experiments and injure workers.

Walls and ceiling coatings need to be smooth, durable and resistant to chemicals and frequent cleaning. Protective wall and ceiling coatings create a long-lasting hygienic barrier that is easy to sanitize, preventing the buildup of dust, bacteria and other contaminants.

For cleanrooms, it is necessary to have seamless transitions from floor to wall to ceiling to minimize potential points of contamination. Seamless integrations, including cove bases, allow the entire space to be effectively cleaned and sanitized, maintaining the required sterility (Figure 4).



Figure 4. Adding an integral cove base where flooring interfaces with a vertical surface provides a seamless transition that helps direct water and cleaning agents toward floor drains, minimizing standing water and bacteria harborage points.

Safety in R&D laboratories and cleanrooms extends beyond contamination control to include fire safety. These systems involve the application of fire-resistant coatings to structural elements, helping to prevent the spread of fire and protect the overall integrity of the building. Proper fireproofing enhances the safety of personnel and equipment, reducing the risk of catastrophic damage.

Advanced industrial grade protective coatings provide the longevity and resilience required to maintain a sterile, safe and compliant environment.

SAFEGUARDING WATER SYSTEMS

Water processing and treatment are essential for various industrial operations – including cooling, cleaning, production and waste management. In many facilities, water must be treated efficiently to meet regulatory demands and promote sustainable practices. Effective

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water treatment requires anticorrosive epoxy or polyurethane coatings and linings that safeguard the various surfaces in water processing systems.

Water treatment in industrial settings encompasses several critical areas:

- **Water Storage Tanks:** These tanks store potable water, process water and high-purity water, requiring coatings that prevent contamination and maintain water quality.
- **Wastewater Storage:** Collecting and treating wastewater generated during industrial processes requires the use of protective tank linings that prevent leaks and corrosion caused by aggressive chemicals and biological matter.
- **Industrial Water Storage:** Storing water mixed with chemicals necessitates the use of robust linings that withstand chemical exposure and prevent structural damage.
- **High-Purity Water Systems:** Coatings must provide an impermeable barrier while also maintaining water purity that is used in industries such as pharmaceuticals and electronics, where high-purity quality is a top consideration.

Several types of robust linings and coatings are used in water treatment applications. Chemical- and erosion-resistant epoxy linings protect concrete and steel

structures from corrosive substances. Polyurethane linings offer flexibility, high-film-build properties and low permeability, along with chemical and abrasion resistance, making them suitable for environments subject to erosive and foreign materials. With high strength and an exceptionally wide range of chemical resistance, epoxy linings are often used in secondary containment areas and wastewater treatment systems.

The application of robust anticorrosive coatings and linings in water processing and treatment facilities extends the life of water treatment infrastructure by protecting assets from corrosion, chemical attack and physical damage. By preventing leaks and structural failures, coatings also help maintain the safe operation of water treatment systems.

WAREHOUSING, STORAGE AND SHIPPING SOLUTIONS

Warehousing, storage and shipping areas serve as the hub for receiving raw materials, storing intermediate products and preparing finished goods for distribution. These environments are often exposed to heavy traffic, mechanical impacts, and exposure to various chemicals and contaminants. Protective coatings in these areas preserve the integrity of surfaces subjected to rigorous use.

Floors in warehousing and storage areas must withstand equipment such as forklifts, pallet jacks and automated guided vehicles. Resinous flooring systems provide exceptional resistance to abrasion, extending the life of concrete surfaces under heavy traffic (Figure 5).

Floors coated with chemical-resistant materials can withstand spills of vehicle fluids, cleaning agents and other industrial chemicals. Those with high compressive and tensile strengths can support substantial weight without cracking or deforming.

High-visibility coatings can mark pedestrian pathways, loading zones and hazard areas to help reduce accident risks. Walls and steel structures in these areas also endure wear and damage. Robust coatings can help protect walls from impacts caused by moving equipment and stored goods.



Figure 5. Heavy-duty industrial grade flooring is needed in warehousing, storage and shipping areas to help protect concrete substrates from potential damage inflicted by heavy moving equipment, high traffic, abrasion and impact.

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Certain industries, such as electronics manufacturing, require specialized solutions for their warehousing and storage areas - including ESD flooring and slip-resistant flooring - with the latter being ideal for loading docks and areas with heavy traffic and potential spills.

FACADE FORTIFICATION

Building exteriors serve as the first line of defense against environmental elements, safeguarding the structural integrity of manufacturing and processing facilities. Exposure to harsh weather conditions - such as rain, humidity, heat, snow, UV radiation and salt - can gradually deteriorate exterior surfaces. To maintain both durability and appearance, it's smart to apply robust protective coatings to these external surfaces.

Precast concrete walls are present in many industrial facilities due to their inherent strength and durability. However, these walls remain susceptible to environmental damage. Protective coatings for concrete walls are designed to address these vulnerabilities - offering weather resistance and effectively withstanding extreme temperatures, moisture and UV radiation to prevent cracking and spalling.

In addition, impermeable coatings provide waterproofing, preventing water infiltration that can lead to freeze-thaw damage and other moisture-related issues. There are also aesthetic benefits, as concrete walls provide a clean and professional look that contributes to the overall appearance of a facility.

Steel structures - including frameworks, support beams and exterior cladding - are particularly prone to corrosion, especially in coastal or industrial environments. Anti-corrosion coatings help shield steel from rust and degradation. Coatings with UV-resistant properties further protect steel from the harmful effects of prolonged sun exposure.

Facility managers face the challenge of managing high energy costs, which can significantly impact their bottom line. Manufacturing and processing buildings can consume vast amounts of energy, which can significantly impact

the environment, depending on the way electricity is locally generated. Facility managers can achieve energy savings in their roofing coating systems. Older buildings or facilities with traditional roofing systems can absorb a significant amount of heat, resulting in higher cooling costs. By installing a reflective and energy-efficient roofing system, facility managers can help lower their roof surface temperature and decrease the amount of heat transferred into the building.

Protective coatings for roofs provide waterproofing, with fluid-applied seamless coatings creating a continuous barrier against infiltration or precipitation and other liquids, including condensation from air conditioning. Other exterior elements - such as doors, windows and ancillary structures - also benefit significantly from protective coatings, which reduce the frequency and cost of maintenance by preventing premature degradation and damage.

PARTNERSHIP FOR PROBLEM PREVENTION

In the ever-evolving landscape of manufacturing and processing, facility managers face a delicate balancing act. They must juggle regulatory compliance, operational efficiency and the well-being of their workforce, all while staying ahead of maintenance demands. The solution lies not just in reacting to issues as they arise, but in proactively fortifying the facility with advanced protective coatings.

By embracing the latest in coating technologies, facility managers can create environments that are not only safe and compliant but also resilient and future-ready. From the bustling factory floor to the sterile precision of R&D laboratories, chemical zones to expansive warehousing spaces, the right coatings help ensure longevity, performance and confidence.

Working closely with experts in protective coatings and leveraging emerging innovations can transform facility management from a reactive necessity to a proactive strategy. Advanced protective coatings offer a promise of durability, safety and excellence in every square foot.

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ABOUT THE AUTHORS

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FIGURES AND CAPTIONS

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