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NEWSLETTER

HEGSEL® FRP 320

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Durable Solution In Aircraft Hangars

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Paint Removal in Aviation Industry

Paint Strippers are among the most effective ways of paint layer removal from surfaces. The substance is specifically suitable for difficult to access areas as well as for intricate parts of structures including edges and corners.

In the aircraft hangars, where there are usually areas with multiple layers of paint and aged paints on the surface, paint strippers are frequently used for the industrial paint removal, since they are more potent compared to thinner and removers. This is due to the strong, usually acidic, chemical composition of the paint strippers that helps to easily remove multiple layers of paint at once.



An Alternative for paint strippers is solutions that are non-chemical, however, they are usually more labor-intensive, non-economical and time-consuming. There are certain disadvantages to each substitute method, for instance:

Heat should be used with caution to remove paint. Using open flames for paint removal can be a fire hazard and also create toxic fumes.

Sanding would also strip away layers of the surface where paint is applied to, while creating fine particles that can be easily inhaled, leading to poisoning and also contaminating the surfaces.

Power Washing can be a challenging method, as mishandling the washing equipment or using the inappropriate amount of pressure would damage the substrate.

Why repainting the aircrafts?

After the painting operation is carried out, the paint itself can gradually initiate to show cracks and chips that are prone to collect moisture and dirt. Subsequently, painted surfaces are also susceptible to filiform corrosion, or worm corrosion, which begins between metallic surfaces and paint and eventually erodes both, producing hydrogen and lifting up the paint layer as it travels across the surface.

On the other hand, planes are regularly repainted to reduce the surface roughness to an optimized level and thereby, keeping the drag low. If the surface roughness exceeds the norms, during the flight, the wind that carries fine particles like sand, causes a very intensive abrasion. Dirt and/or insect adhesion could also increase the roughness and result in skin friction drag, whereas reduction of surface roughness can increase the regions of laminar flow, resulting in lower skin friction drag when the flow is turbulent.

Conversely, without this maintenance, after a year or two, because of the roughened surface and the raised friction, the fuel consumption could increase up to 30% which is equal to approx. 60 tons of excessive fuel consumption in Boeing 747 aircraft, as an instance. Accordingly, the repainting processes are essential to lower operating expenditures and fuel costs maintaining the premium aviation assets.



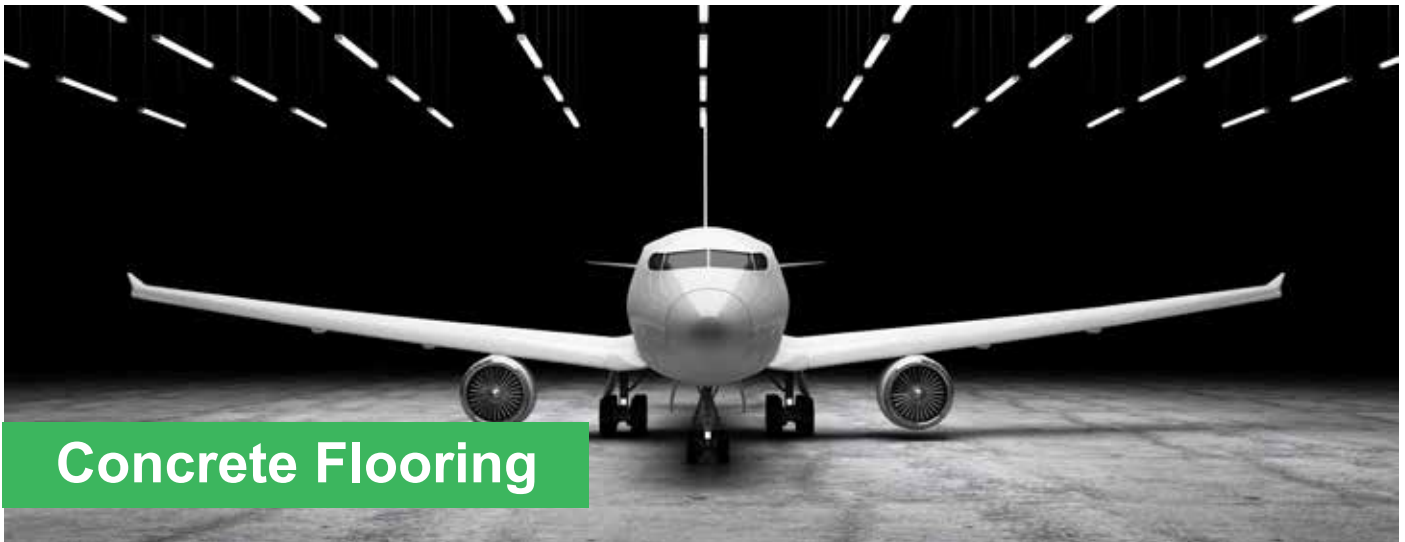
Corrosive Nature of the Aircraft Paint Strippers

Paint strippers cause corrosion on the surface: Depending on the chemical compositions, they can be made up of caustic agents such as sodium hydroxide (NaOH) and potassium hydroxide (KOH); or acidic agents like Formic acid. Another type includes solvent paint strippers with active ingredients such as methylene chloride.

In alkaline paint strippers, caustics are responsible for their high pH values (usually around 13-14); while any substance with a pH above 11.5 is considered corrosive. Acidic paint strippers on the other hand, can cause considerable damage to the concrete in a short period of time. The alkaline composition of the concrete itself can dramatically increase the damage when in contact with the acidic contents. Solvent paint strippers are corrosive toxic compounds as well that could also have severe health effects.

Challenges in Aircraft Hangars Floorings

Aircraft hangars are not only important for the storage and maintenance of the plane but also for providing a fueling area. They are constantly exposed to spills of aviation chemicals and damage from heavy loads, traffic, impact and abrasion. Therefore, a functional flooring system should be applied to effectively withstand the extensive daily grind.



Concrete Flooring

Bare concrete is not regarded as a sufficient flooring system for modern aircraft hangars. The porous nature of the concrete can very easily soak solvents and other aircraft fluids, eventually causing the concrete to break down. Unsealed porous concrete floorings also pose a risk to the sensitive electrical equipment by creating static charge build up and excessive dusting. Depending on the corrosiveness of the substances coming into contact with the concrete, the chemicals would permeate through the slab into the earth below, and causing unevenness and damage in the flooring. Additionally, scraping of heavy parts across the floors as well as impacts would badly damage the bare concrete.



Malfunctions of Common Floorings

To protect aircrafts hangar areas, common flooring systems such as Epoxy, Vinyl Ester and Urethane are very vulnerable when exposed to harsh chemicals. When tested with exposure to certain paint strippers, many cases have reported the durability of Vinyl Ester as less than a month and for Epoxy as less than a week. Depending on the corrosiveness of the exposed chemicals, in some instances, deterioration had started even during the first 24 hours of continuous exposure. Moreover, Cracks and breakages have been reported numerous times using traditional floorings because of their inadequate resistance against mechanical loads and impact.

HEGSEL® FRP 320

Glass Mat Reinforced Phenol Lining System

HEGSEL FRP 320 is a glass fiber reinforced lining system based on phenol resin which provides intensive protection for chemically and mechanically stressed areas. By using a hybrid mat, HEGSEL FRP 320 could also provide electrical conductivity.

Considering the required characteristics, specifically regarding the simultaneous chemical resistance and mechanical strength of flooring systems suitable for aircraft hangars, this laminate system has been proven to be the only option, compared to the common floorings, which has practically survived the chemical tests including continuous exposure to highly aggressive acidic paint strippers without any damage. Additionally, in studies of previous cases, after many years of withstanding heavy mechanical loads, HEGSEL FRP 320 is still in good conditions.



Exceeding the requirements for Aircraft Hangar Flooring

Aircraft hangars demand unique set of requirements to protect the underlying concrete while ensuring safety and environment efficiency.

Durability

The robust flooring system should not only withstand chemical corrosion, but also effectively hold up against various mechanical factors including heavy weight of aircrafts, extreme mechanical loads by large vehicles movements, impacts from dropped tools and harsh scratches. Not being able to utilize the entirety of a hangar due to the flooring failures, will result in unfavorable outcomes i.e. operating at a reduced capacity and the consequent forfeits including costs, manpower and time. HEGSEL FRP 320 has been manufactured to hold up against heavy loads in the aviation industry durably. Implementation of HEGSEL FRP 320 would improve the sturdiness of the surface exceptionally, fulfilling the mechanical requirements of hangar floorings.

Chemical Resistance

Servicing an aircraft always involves chemical compounds such as aviation fuels, hydraulic fluids, lubricants and paint strippers. Consequently, the hangar flooring system must be resistant to all the aviation-related chemicals, capable of both short and longer-term exposure without deterioration.

HEGGEL FRP 320 provides considerable resistance against a broad range of harsh chemical compositions, including corrosive paint strippers as well as other aviation fluids present in air hangars.



Compressive Strength and Impact Resistance

A flooring system that is too weak, will inevitably crack and fail when subjected to normal work practices. Due to the heavy tools and equipment drop, the compressive strength and impact resistance of the floor is an important requirement. The flooring system should additionally be strong enough to cope with increased pressure from heavy wheeled traffic.

Despite continues heavy loads and various impacts, HEGGEL FRP 320 system maintains its integrity without being cracked or breaking down.

Slip Resistance

According to the estimations of National Business Aviation Report (NBAA), 10% of all aircraft ground damages is caused by hangar movements. Increasing the underfoot tractions by the slip resistant HEGGEL FRP 320 laminate system, could considerably reduce the number of on-site accidents while reducing.

Bond and Tensile Strength

Hangar flooring must be tenaciously bonded to the concrete substrate and proper flexibility is required to withstand the extreme conditions in aviation hangars. Exclusively processed Phenolic resin using mineral fillers, HEGGEL FRP 320 demonstrate excellent adhesion to the substrate while ameliorating mechanical properties. The layer-wise installation of HEGGEL FRP 320 using glass fiber mat, reinforces the mechanical properties of the lining system greatly.

Electrical Conductivity

There is always electrical equipment, sensitive avionic and also explosive/flammable materials, e.g. stripper solvents housed in hangars. Accordingly, electrostatic dissipation through conductive flooring is a requisite additional precaution to safeguard equipment and personnel. Using the hybrid mats, HEGGEL FRP 320 is characterized as an electrically conductive lining system.

