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Market Segment: *Airfield Runways - Maintenance & Repair*

Problems:

The surfaces of concrete airfield aprons and runways deteriorate for a number of reasons:

- **surface scaling due to freeze/thaw**
- **cracking due to sulphate attack**
- **cracking due to alkali aggregate reactivity**
- **surface erosion in hot and sandy climates**
- **surface dusting, scaling and plastic shrinkage cracking (micro cracks) due to hot weather concreting and improper finishing**
- **surface deterioration due to de-icing fluids**
- **deterioration of joints due to freeze/thaw and physical damage**
- **deterioration due to de-icing & jet fuel chemicals**

Solutions:

Minor Surface Deterioration & Protection Against Jet Fuel and De-icing Chemicals

Penetrating Sealers are used to prevent problems from developing and also to prevent further decay of minor surface problems. The penetrating sealer can be spray applied very quickly (the traffic can be open almost immediately after spraying) and economically.

To prevent penetration of the de-icing & jet fuel chemicals into the concrete slab, resulting in an environmental damage, we recommend use of sealers. The best and most economical system consist of one or two coats of penetrating sealer, followed by one or two coats of a film forming sealer. Two sealers create a synergistic effect, where the penetrating sealer waterproofs and protects “in depth” and the film forming sealer protects the surface and the penetration of the fuels on the surface.

Gem-Gard SX

A siloxane solvent borne penetrating sealer is used to prevent freeze/thaw deterioration of concrete and prevent the penetration of salt solution and other water borne solutions into concrete. Life cycle (re-coat period) is over 5 years.

Gem-Gard SX has been used for over 15 years by various Departments of Transportation, including State of New York (USA) and Alberta (Canada). It has been also been performing successfully as a protection against chloride and water penetration and freeze/thaw deterioration of parking garage concrete slabs. Gem-Gard SX has been extensively evaluated and specified by the Polish Aviation Authority for application over aprons on civilian airports. The total area applied in the 1997 construction season is 120,000 m² (over 1.2 million ft²). In 1998 the total area will exceed 300,000 m² (over 3.3 million ft²).

Gem-Seal MB

An acrylic solvent borne, film-forming sealer protects concrete from penetration of de-icing solutions. It does not make concrete slippery, since it has a good penetration. It has been primarily used in applications over concrete slabs where protection against jet fuel, light oil, de-icing and other various chemicals is essential. It is also used in bridge applications alone or in combination with Gem-Gard.

Combined Gem-Gard SX & Gem-Seal MB

The most effective way of protecting concrete against chemical attack (water borne as well as solvent borne), is to use Gem-Gard SX as the 1st coat, followed by Gem-Seal MB as the 2nd coat. The two sealers act together in a synergistic effect. The life cycle (re-coat time) is in highly exposed areas 5 - 6 years and in less exposed areas up to 10 years.

In addition, the concrete tanks used for collection and storage of de-icing chemicals must be waterproofed and protected. The best and most economical system for this application uses reinforced flexible cement membranes (see Cem-Kote FLEX).

Medium Surface Deterioration 6 – 20 mm (1/4” – 1”)

Micro-cracks form in the cement paste and in time grow in size and cause destruction of the cement paste binder at the surface. This deteriorated layer may vary from a few mm to 10 mm and more. Large sand aggregates, or small gravel particles are released presenting a serious FOD (Foreign Object Damage) problem to jet engines.

This often occurs underneath epoxy or modified asphalt sealers that are not completely watertight, or lose their water-tightness over time. The water penetrates through the coating and is trapped, causing freeze/thaw damage. For this depth of repair a thin overlay provides an economical and fast method of repairing concrete surfaces. Special fibre-reinforced toppings with high toughness, abrasion resistance and bond are used.

Gem-Crete HDO

A thin 10-20 mm (1/2–1 in) waterproofing overlay prevents the penetration of various chemicals into the concrete and the subsoil. For details see Market Segment: *Airfield Runways – Gem-Crete HDO*.

Deep Surface Deterioration 25 mm (1”) and up

Typically 75 – 100 mm (3” – 4”) thick overlay is used to repair the surface. Special bonding agents and concrete admixtures based on micro-silica and fibres, combined with highly effective chemical additives are used to achieve the high performance requirements required for this type of repair.

Adi-Con CSF(R)

A micro-silica, fibre-modified admixture that increases the compressive strength and abrasion resistance of concrete and dramatically reduces its permeability. CSF(R) modified concrete is used as a concrete overlay, as well as in construction of full depth slabs. The CSF(R) modified concrete is watertight and will not allow penetration of chemicals into the subsoil.

Integral casting of conventional concrete with a CSF(R) modified concrete top layer is another option. The CSF(R) modified concrete is watertight and will not allow penetration of chemicals into the subsoil.

Slab Joint Deterioration

The freeze/thaw damage, combined with physical damage is the most common cause of the slab joint deterioration. The joints are rebuilt using high performance cement, fibre-reinforced materials modified with polymers. These materials have a high strength development, providing the speed of application required and low shrinkage, high bond, abrasion resistance and ease of application.

The repair of the joint is followed by a placement of the joint sealant that can be either performed rubber profiles or two component urethane or cold tar urethane liquid applied sealant.

Fibre-Patch ES

A fast set, fast strength development, cement based fibre-reinforced product for the repair of concrete slab joints. Fibre-Patch ES exhibits a high impact resistance and a high bond to concrete.

Gemite Products Inc. has an extensive experience in a wide variety of protection, maintenance and repair of concrete structures. Gemite Group offers effective and economical solutions, including technical support, material selection and site support worldwide through its network of associated companies.

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