

Republic Polytechnic

Singapore (2006)

BACKGROUND

Republic Polytechnic is a post-secondary institution that began construction of their new Woodlands Campus in 2004, which would serve thousands of students and community members. The 20 hectare Woodlands Campus is made up of a central nucleus containing 11 identical, high-rise learning pods that are linked by two large, elliptical concrete decks of common facilities, known as the Lawn and the Agora. The Agora houses a library, auditoriums, lecture rooms, cafeterias and informal reading and recreation spaces. The Lawn features a grassy area, a sunken garden and various landscaped spaces.

In planning the Woodlands Campus, waterproofing the suspended concrete slabs that make up the Lawn and the Agora was a key concern for the project team. Water leaking through the slabs would flood the laboratories, restaurants and classrooms beneath, and accessing the concrete beneath the Lawn for repairs would mean tearing up the grass and landscaping. The team needed to find a permanent solution that would be easy and quick to apply

SOLUTION

The project team chose Krystol Internal Membrane (KIM) to waterproof the suspended slabs of the elliptical disks that make up the Agora and the Lawn. A sunken courtyard and an Olympic-sized swimming pool were also waterproofed using KIM. More than 60,000 kilograms (132,275 pounds) of KIM and 7,500 cubic metres (9,810 cubic yards) of KIM-treated concrete were used in the new Republic Polytechnic campus, which opened in March 2006.

Key factors in the team's decision to use KIM instead of conventional waterproofing membrane systems were its ease of application, which saved hundreds of hours of labour, weeks of construction time and thousands of dollars in construction costs.



More than 60,000 kilograms (132,275 pounds) of KIM was used at Woodlands Campus.



The suspended slab that made up the Lawn and the Agora was a key waterproofing concern for the team.

OWNER:

Republic Polytechnic

PROJECT MANAGER:

PM Link PTE Ltd.

ENGINEER:

Meinhardt (Singapore) PTE Ltd.

MECHANICAL &

ELECTRICAL ENGINEER:

Beca, Carter, Hollings & Ferner
(S.E. Asia) PTE Ltd.

ARCHITECT:

DP Architects PTE Ltd.

CONTRACTOR:

China Construction – Taisei JV

QUANTITY SURVEYOR:

Davis Langdon and Seah
(Singapore) PTE Ltd.

DISTRIBUTOR:

Lee Construction PTE Ltd.

PRODUCTS & TECHNICAL SPECIFICATIONS:

Learn more at kryton.com
Krystol Internal Membrane (KIM)[®]

Kryton goes to school in Singapore

Kryton's new concrete waterproofing technology, Integral Crystalline Waterproofing (ICW) has been used at Republic Polytechnic's Woodlands Campus in Singapore. This innovative technology creates a chemical reaction within concrete that causes crystals to form and grow, filling the spaces between concrete particles and permanently blocking water.

BACKGROUND

Established in 2002, Singapore's Republic Polytechnic is a post-secondary institution that prepares local and international students for careers in engineering, technology and applied sciences. In 2004, work began on the institution's new home, the Woodlands Campus, which was aimed to serve thousands of students and community members.

The 20 ha campus is made up of a central nucleus containing 11 identical, high-rise learning pods and one staff administration hub. The learning pods, which include laboratories and study areas, are linked by two large, elliptical concrete decks of common facilities.

The Agora houses a library, auditoriums, lecture rooms, cafeterias and informal reading and recreation spaces. The Lawn features a grassy area, a sunken garden and various landscaped spaces.

In planning the Woodlands Campus, waterproofing the suspended concrete slabs that make up the Lawn and the Agora was a key concern for the project team. Water leaking through the slabs could flood the laboratories, restaurants and classrooms beneath, and accessing the concrete beneath the Lawn for repairs could tear up the grass and landscaping.

Since addressing future leaks in the Lawn or the Agora could be costly, time-consuming and inconvenient to students, staff and the public, the team needed a concrete waterproofing system that was permanent. And in light of the project's tight construction timeline, the system needed to be easy and quick to apply.

SOLUTION

After investigating various concrete options, the project team chose Kryton Internal Membrane (KIM) to waterproof

the suspended slabs of the elliptical decks that make up the Agora and the Lawn. A sunken courtyard and an Olympic-sized swimming pool were also waterproofed using KIM. The product was supplied by Kryton's local distributor Lee Construction Pte Ltd.

KIM is based on integral crystalline

waterproofing technology. When added to a concrete mixture or applied to existing concrete, the crystalline chemicals are absorbed into the concrete by capillary action and diffusion. Once inside the concrete, the crystalline chemicals begin growing crystals and fill the spaces between concrete particles.



Kryton's Integral Crystalline Waterproofing technology was applied on the Agora, one of the large elliptical concrete decks of the common facilities.



The 20 ha Republic Polytechnic's Woodlands Campus is made up of a central nucleus containing 11 identical, high-rise learning pods, which include laboratories and study areas.

As long as moisture remains present, the crystals continue to grow throughout the concrete, reaching lengths of many centimeters over time. Once the concrete has cured, the crystalline chemicals sit dormant until another dose of water, such as through a new crack or rising water table, causes the chemical reaction to begin again.

The ability to reactivate in the presence of water gives the crystalline-treated concrete the ability to 'self-seal'. When cracks form due to curing shrinkage, settling on seismic activity, water entering through them causes new crystals to form and grow, blocking and filling the cracks. Self-sealing is one of crystalline technology's most unique and useful features, and can help to significantly reduce the long-term maintenance and repair costs of a concrete structure.

KIM is also resistant to physical damage and deterioration. With a head pressure of up to 140 m, it is also effective against hydrostatic pressure.

KIM product is usually supplied as an easy-to-use, dry powder comprising Portland cement, silica sand and special chemicals that can simply be added to the ready mix truck at the plant or jobsite to create a powerful moisture barrier in slabs and walls. There is no need for

surface application at the construction site, as the product can be simply added to the concrete.

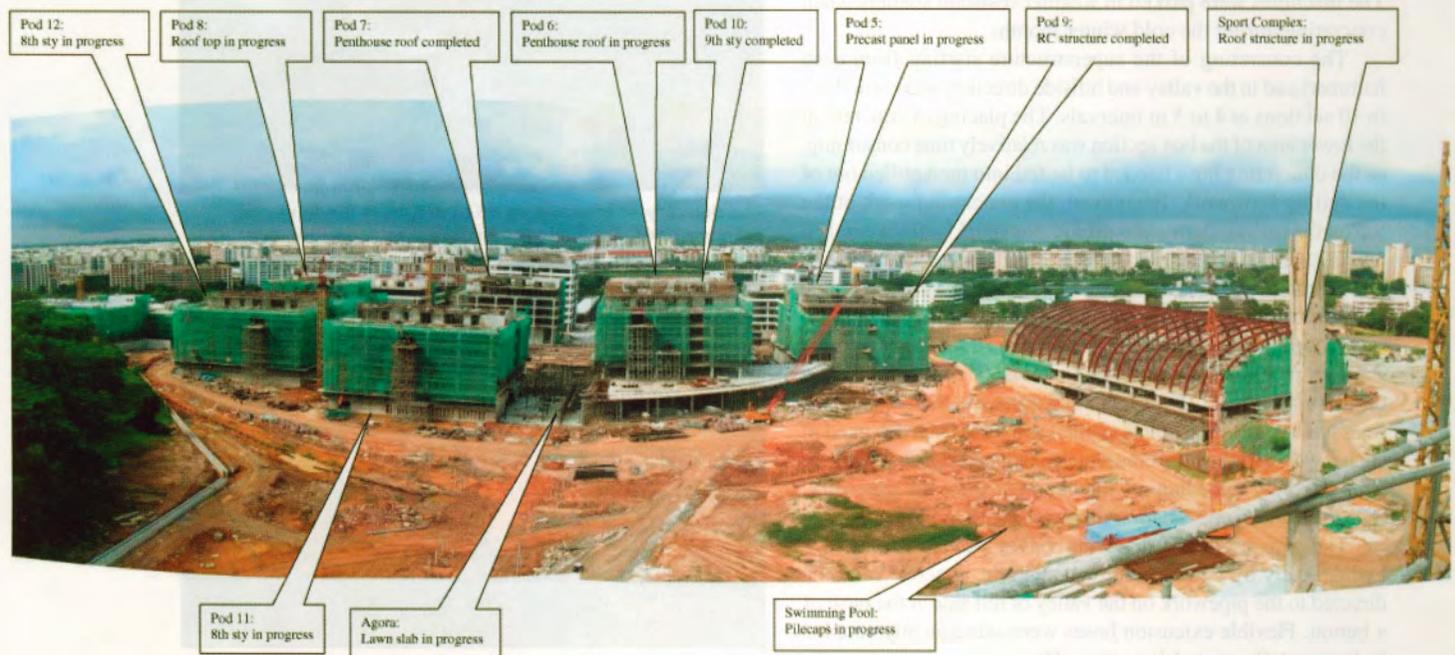
More than 60,000 kg of KIM and 7,500 cu m of KIM-treated concrete was used in the new Republic Polytechnic campus, which opened in March 2006.

The project was designed by award winning architect Fumihiko Maki and DP Architects. The main contractor for the project is China Contractor – Taisei JV and the engineer is Meinhardt (Singapore) Pte Ltd.

Enquiry: leo@kryton.com



The construction site of Republic Polytechnic in June 2004.



An overall site view of the Woodlands Campus construction site in June 2005.