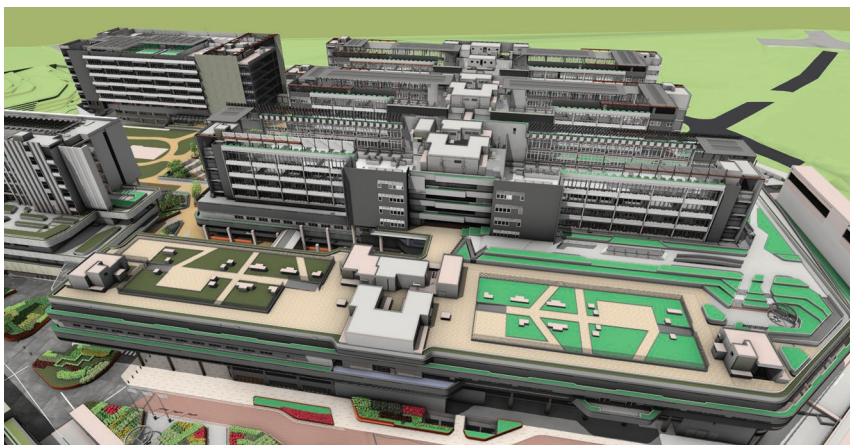




[Bird's eye view of the Woodlands Health Campus (WHC)]

WHC An Advanced Futuristic Hospital in Singapore

In March 2018, Ssangyong E&C secured a contract for construction of the Woodlands Health Campus (WHC), the largest advanced hospital to be built in Singapore, commissioned by the Ministry of Health (MOH). Worth USD 740 million, the Campus is currently under construction.



[3D BIM images]

Hospital Construction: The Pinnacle of All Construction Projects

The WHC will be built on a 76,600 m² site in the Woodlands area in northern Singapore. The 1,800-bed complex (Total floor

area: 246,000 m²) will feature eight hospital buildings (4B/7F). This future-ready hospital will consist of four distinct medical institutions (a general hospital, a community hospital, a nursing home and a hospice), each embedded with the latest IT technology. The construction is

expected to last 33 months.

Considered the pinnacle of all construction projects, hospital construction entails the construction of diverse complex facilities because each facility (e.g. operating rooms, wards) serves different purposes. Especially, building a hospital requires a robust, earthquake-resistant design/construction as advanced medical facilities must not fail during an earthquake.

The WHC will also feature a civil shelter on the second and third floors underground, to prepare for a war or other emergencies.

The shelter will be designed and constructed in compliance with Swiss defense standards so that it can still be used for core medical activities even during a war. Walls up to 1.6 m thick and explosion-proof doors weighing a maximum of 22 tons will be also installed.

Design Changes: A 'Nightmare' Waiting to Happen

The Singaporean Government is planning to install advanced medical equipment in the WHC, to ensure it is an advanced futuristic hospital. However, without knowing what equipment will be installed, it is difficult to determine where even a small element (e.g. electrical outlet), should be placed.

As such, countless design changes are currently being made, and it is impossible to image how many more will be needed in the future, a situation dubbed "a nightmare" by the Singaporean Government, because every new equipment-related decision requires changes to be made in the design.

Another characteristic of hospital construction is that most structural

elements must be prefabricated, then assembled on site just like Lego blocks. As such, USD 3.5 million was spent to install, in a separate space, over 100 life-sized mock-up pieces resembling each part of the WHC's main facilities. In cases where mock-ups could not be produced, VR models were created instead.

When the CEO and staff of the WHC visit the site and provide opinions on the design and materials for each room, their recommendations must be adhered to.

BIM Design Using VR Technology

The Singaporean Government is continuing to expand the use of BIM-based designs in its projects, and the move has recently been gaining momentum.

The WHC project, in particular, stressed the use of BIM-based design and con-

struction from the bidding phase, highlighting the ever-growing importance of BIM in construction projects.

For the WHC site, 3D and VR-based BIM was used to implement even the finishes of each room, to enhance the understanding and satisfaction of actual users (e.g. doctors and nurses). Furthermore, finishes for over 5,000 rooms implemented through 3D-based BIM are expected to minimize design changes related to finishes.

The BIM design has also removed the need for the project team to present numerous blueprints during client meetings, to discuss site inspections and process management issues.

Instead, a tablet PC is now the only thing that's needed. The WHC site currently operates a dedicated BIM team with more than 50 members. **S**



[Perspective view of the construction site]