

MTR Corporation Limited

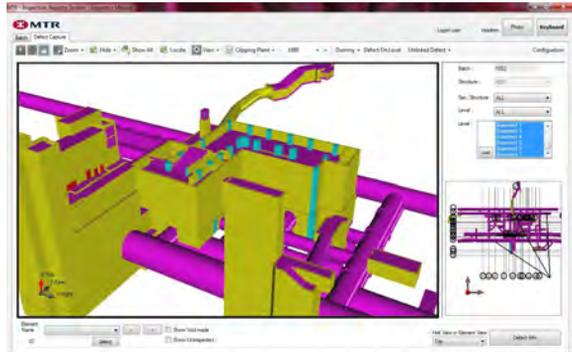
Project:
Re-Development of
Inspection Registry System

Location:
Hong Kong

Type:
System Development

**Scheduled Time of
Completion:**
2011

BIM-powered Inspection System All-new, All-BIM Inspection System



“We need to embrace new challenges and be flexible to adopt IT changes,” says Dorian Leung, Structural Inspection and Investigation Manager, MTR Corporation. Compared to some models with their fancy architectural features and so forth, the 3D IRS system does look basic, with little but walls, columns and other structural elements. Yet the simple appearance belies the fact that this is a pioneering BIM project: the MTR team knows of no other instance of BIM being used for inspecting building defects.

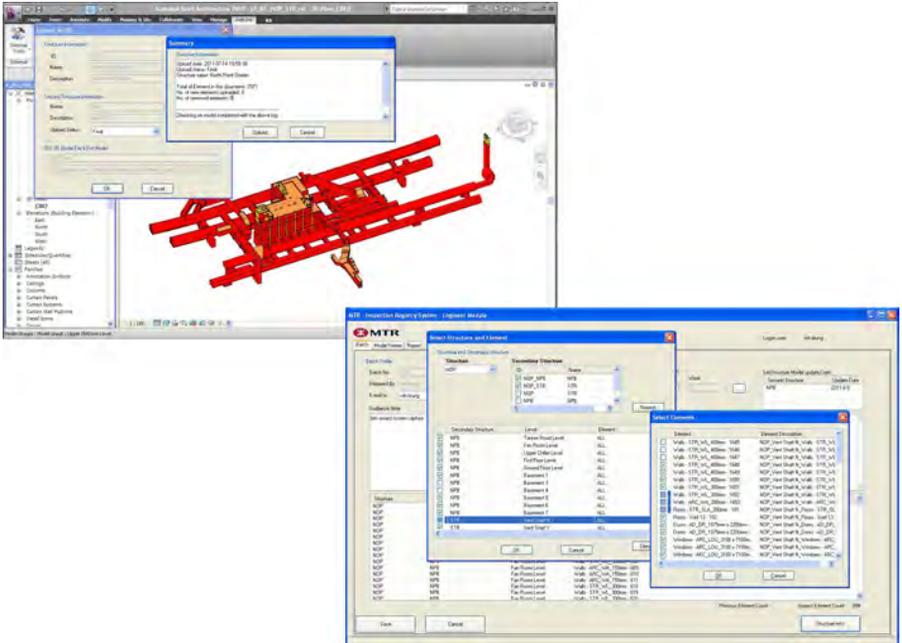
The project stemmed from a review of the old system for defect inspections, which had been in place since 1995. This system was based on a multitude of 2D drawings – sometimes hundreds of them for an individual station, making it challenging and time consuming for inspectors to find and record locations of defects. Plus, the system was prone to errors, partly as it was hard to correlate defeat by their real world coordinate on 2D drawings.

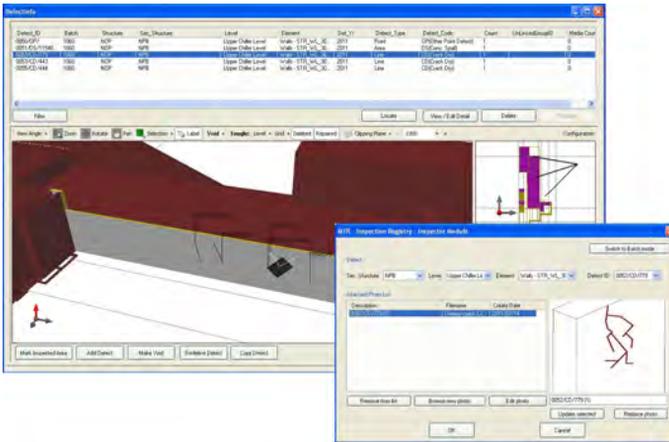
Revamping the inspection system

The review led to plans for a substantial revamp of the system. Members of the MTR Corporation’s drawing office proposed using BIM for defect inspections and reporting: they had experience in manipulating station BIM models. Ms Leung and colleagues conducted a

market survey, and could only find BIM being used for building design and construction. This proposition set to be the first time BIM would be applied in structural maintenance.

Work on the new Inspection Registry System was conducted by a cross-discipline task force within the MTR Corporation and the system developer, including Systems Analyst Dickson Luk. “We aimed to use new technologies with 3D models, and eliminate thousands of drawings,” he says. The project team created a customised plug-in for Revit, to bridge 3D model preparation, system data storage and follow-up activities, and produced an initial BIM model for North Point station. With this model, they checked whether BIM could indeed be used for maintenance work.





The results were promising, and the team progressed to a more comprehensive trial, covering Fortress Hill station.

This trial was also successful, and the BIM-based Inspection Registry System will be expanded to cover all the MTR stations, depots and ancillary buildings.

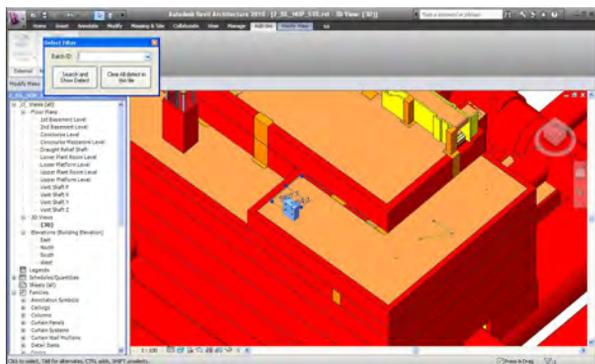
One model is for all

Inspectors who have been trained to use the new system – in courses lasting just half a day, followed by practice in stations – find it not difficult to use, and can already see the benefits. New inspectors benefit the most, as the model gives a visual view of the structure of a station, making it easier to understand.

No longer is it a great advantage to have prior knowledge of a station, in order to navigate on a notebook computer to a

particular drawing that covers a location. Instead, says Mr Luk, “On a single model, an inspector can easily turn on and off floor levels as required – such as turn off everything but the concourse, and move around in 3D to find the location.”

Also, instead of dozens or hundreds of 2D drawings, there is one BIM model for each station. “One model is for all, so inspectors can work efficiently,” notes Ms Leung.



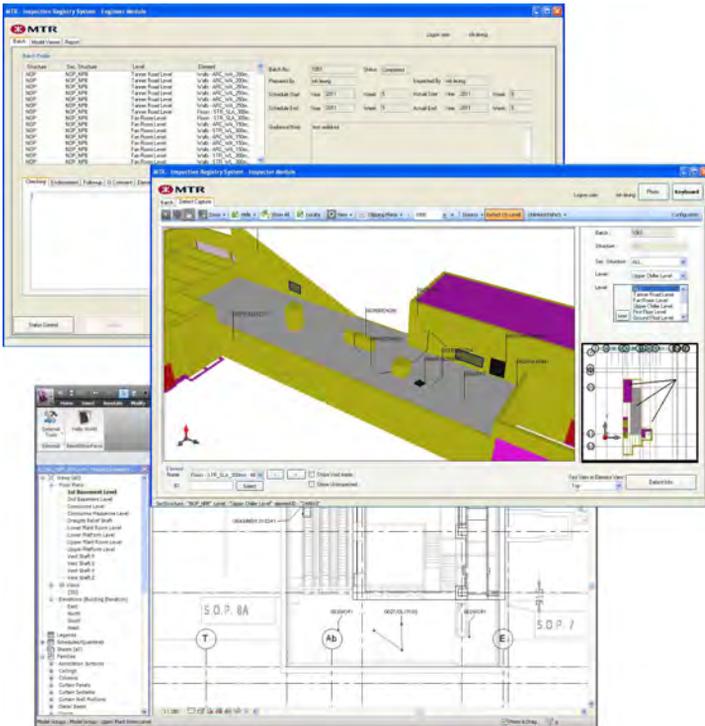
Tight collaboration and time saving

An inspector assigned to a station downloads that station's BIM model to a notebook computer. On finding a defect, such as a crack on an external wall, he or she can record the location on the BIM model, together with a description, and perhaps attach a photo or video. The inspector can then update the BIM model in the server. The engineers retrieve information from the system for evaluation of the structural condition and arrange necessary follow-up action.

The BIM model is used in stages of work, from preparing inspection orders, through on-site

inspections, to follow-up maintenance – and is updated after structural modification work. This helps ensure tight collaboration across different teams. Hence, the need for rework is minimised, and subsequent work will always be based on the latest BIM model.

The new system is far more efficient than the time-consuming and error-prone 2D processes. It slashes the time needed from draughtsmen by around 50%. This is because it is no longer required to prepare a 2D drawing for each surface of a structure in order for inspectors to mark defects; and draughtsmen are no longer required to verify locations of previous defects on revised 2D layouts.





Engineers save about 10% of their time, partly as it is far easier to check one 3D model rather than hundreds of 2D drawings, and locating structural defects is more straightforward. Inspectors too save about 10% of their time, as they can more quickly find where to input defect records, and easily locate structural defects.

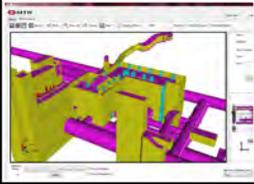
For more than BIM professionals

Though other teams that conduct various station inspections are not yet utilising BIM, Ms Leung and Mr Luk consider that the new Inspection Registry System may provide insights for them, perhaps encouraging similar system revamps. Plus, BIM models are progressively used in construction

and renovation projects of stations – and eventually, the structural defects system will be able to share the same BIM models with other teams achieving synergy within the Corporation.

“I think BIM will become more popular in the long term,” says Mr Luk. “Now, it is mainly used by BIM professionals. In future, inspectors, engineers and managers will gain more and more access to BIM models – which will enhance our expertise in managing the Corporation’s railway assets.”

** All images in this article provided by MTR Corporation Ltd.*



ABOUT MTR CORPORATION LIMITED

Carrying an average of 3.9 million passengers every weekday, the MTR is regarded as one of the world's leading railways for safety, reliability, customer service and cost efficiency.

The MTR Corporation was established in 1975 as the Mass Transit Railway Corporation with a mission to construct and operate, under prudent commercial principles, an urban metro system to help meet Hong Kong's public transport requirements. The Company was re-established as the MTR Corporation Limited in 2000 after the Hong Kong SAR Government sold 23% of its issued share capital to private investors in an Initial Public Offering. MTR Corporation shares were listed on the Stock Exchange of Hong Kong on 5 October 2000. It marked another major milestone on 2 December 2007 when the operations of the other Government-owned rail operator, the Kowloon-Canton Railway Corporation, were merged with the MTR Corporation, heralding a new era in the Hong Kong railway development.

The merged rail network comprises nine railway lines serving Hong Kong Island, Kowloon and the New Territories. In addition, a Light Rail network serves the local communities of Tuen Mun and Yuen Long in the New Territories while a fleet of buses provide convenient feeder services.

The Corporation also operates the Airport Express, a dedicated high-speed link providing the fastest connections to Hong Kong International Airport and the city's newest exhibition and conference centre, AsiaWorld-Expo.