

COMPANY

Electrical and Mechanical Services
Department, HKSAR Government

PROJECT

Lifecycle Building Information Modelling
- Asset Management (BIM-AM) System for
Buildings Operation and Maintenance

LOCATION

EMSD Headquarters Building

TYPE

Pilot

SCHEDULED TIME OF COMPLETION

December 2015

Visually Intuitive and Cross-Referenceable Next-Generation O&M Tools



About Electrical and Mechanical Services Department, HKSAR Government

The Electrical and Mechanical Services Department (EMSD) of the HKSAR Government discharges its services to the public in Hong Kong via two separate teams: Regulatory Services and Trading Services.

Our Regulatory Services team regulates electrical, mechanical and gas safety, and railway safety, as well as energy efficiency, via law enforcement and public education. It also monitors the technical performance and development plans of the electricity supply companies, and gives professional and technical support to the Government's wide range of safety and environmental initiatives from time to time.

Our Trading Services team provides electrical and mechanical, electronic engineering and building services to government departments and public bodies. The team serves diverse client venues including the airport, hospitals, schools, security forces, transport and highways, port and harbour, government offices and law court buildings as well as public recreational and leisure facilities, with the ultimate goal of improving the quality of life for the public.

The Project

EMSD has proposed and implemented a novel architecture for exploiting BIM in integrating asset management (AM) and other operation and maintenance (O&M) systems/tools, including Building Management System (BMS), Closed Circuit Television (CCTV) system, Radio Frequency Identification (RFID) scanning tool, Real Time Location System (RTLS), and wireless ad-hoc devices. An integrated lifecycle BIM-AM System has been developed to implement the novel architecture, and the results have successfully demonstrated the system capabilities and potential for next-generation building O&M services.

The Challenges

BIM application in the O&M stage of the building lifecycle is yet to be explored, and there is still a question regarding whether or not directly applying BIM to AM can significantly benefit O&M. While there are many studies and applications focusing on data population from BIM to facility management/asset management software, no well-established model and commercially available solution for full integration (i.e. visually intuitive cross-referencing) of BIM with AM could be found in 2014. Nor was there well established integration with other proposed O&M systems/tools, namely BMS, CCTV system, RFID scanning tool, RTLS, and wireless ad-hoc devices.

The Solution

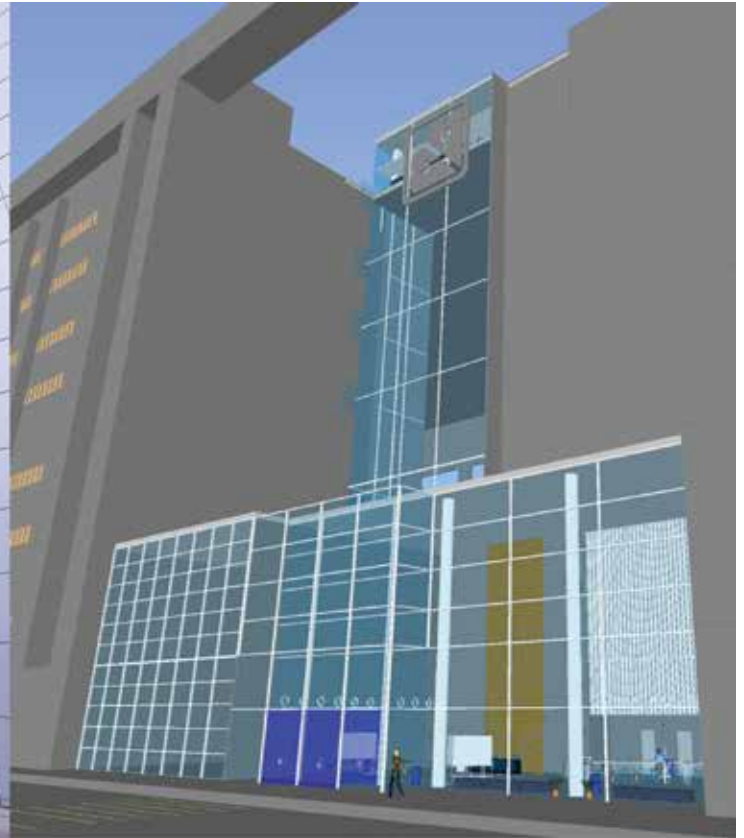
EMSD has investigated the appropriate integration between BIM and various O&M systems/tools. The novelty and specialty of the BIM-AM System is at the forefront of BIM integration in terms of the integration diversity and extent. It enables visually intuitive cross-referencing of real world data to BIM models, and even to asset attributes, maintenance record, system topology, manual and system drawing at a mobile terminal. In addition, pre-diagnosis and condition monitoring based on real-time information from BMS, CCTV system, and wireless ad-hoc devices could be achieved. By integrating the BIM-AM System with RFID technology and RTLS, fixed and movable assets could be efficiently located.

The Benefits

BIM offers numerous benefits to this project. BIM is a centralised database model, carrying all interdependent and coordinated information in an effective and efficient manner. Each individual asset could be tied to its 3D geometric location. This is far superior to the non-geometric information exchange between a BIM model and facility management/asset management software applications – thus enabling easy, real-time, seamless and visually intuitive cross-referencing to a BIM model when carrying out O&M activities on-site by quickly manoeuvring the related area.

Better with BIM

BIM not only enables maintenance staff to perform an efficient O&M workflow by identifying faulty equipment and fault locations, but can also provide abundant visual information on any MEP installations, down to detailed piping and ducting works during design simulations. Such visualisation is of paramount importance for effective pre-planning and site preparation in alterations, additions and improvements work. This is particularly useful when a site is not easily accessible or the concerned asset is installed in a concealed area. Moreover, BIM can be of a tremendous help in defect reporting and on-site system handover.



The BIM model of the facade of EMSD Headquarters building as compared with the real photo
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government



The BIM model of the Lecture Theatre of EMSD Headquarters
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

The BIM model of the AHU room providing HVAC services to the Lecture Theatre
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government



The screen capture showing the results of RFID scanning at mobile terminal
for further enquiry of asset information
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government



The screen capture showing typical asset details and features at mobile terminal
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government