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「大處著眼、小處著手」- 採用「建築信息模擬」技術經驗分享 “Think big, Act small”- Experience Sharing on BIM Adoption

建築信息模擬技術(BIM技術)為數碼化程序,可演示和管理建築數據,一直備受建造業青睞。BIM提供一個協作平台,讓不同界別的建造業專業人士通過數碼模型,透視、檢討和完善工程設計,理順建造流程,並協助管理資產,從而在建築生命週期中提升生產力,並讓各個環節互相配合。

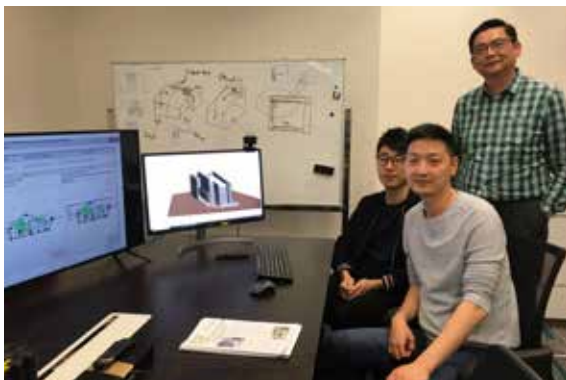
為協助建造業更佳地體驗BIM技術的好處,政府規定由2018年1月起,任何價值超過3,000萬元的主要政府基本工程項目,均須採用BIM技術。截至現時為止,業界反應十分正面,合共224項採用BIM技術的顧問或工程合約已進行招標,當中162項已經批出,合約總額達1,130億元。

為鼓勵本地建築公司廣泛採用BIM技術,並提升應用有關技術的能力,建造業創新及科技基金(基金)向業界提供資助,以參加有關BIM技術的培訓,及採購BIM硬件/軟件。截至2019年年底,基金共批核519項與BIM技術相關的申請,資助金額超過5,000萬元。

多維創作集團有限公司(多維創作)是一家本地初創企業,在2014年年底成立,專門從事建築科技和建築發展技術的開發工作,包括提供與BIM有關的顧問服務。早前,多維創作與我們分享基金如何協助他們制訂採用BIM技術的路線圖,公司董事吳萬里先生非常感謝基金提供協助,讓公司克服在採用BIM技術方面遇到的財政困難。對初創公司來說,獲得七成資助能大大減輕他們購置BIM硬件和軟件的負擔。

多維創作深信BIM技術能帶來莫大裨益,因此即使合約中沒有相關規定,公司亦會在建築項目主動採用BIM技術。為說明該公司的BIM服務,公司行政總裁朱盈麟先生分享在黃竹坑新灣村附近建造一個公共廁所的實例。服務範圍包括構建BIM模型,以提供建築、結構和屋宇裝備設計,以及協調跨專業合作、分析施工期間出現不協調的情況和管理項目進度等。多維創作在項目中採用BIM技術,讓客戶認識到BIM的好處,例如加強溝通,提高

生產力,以及減少建築廢物。有見客戶親證BIM的好處,並對應用BIM的態度由被動變為主動,吳先生實在感到非常高興和欣慰。



Building Information Modelling (BIM), a digitised process of generating and managing building data, has been a star player in the construction industry. It provides a collaborative platform for multi-disciplinary construction professionals to make use of digital representation to visualise, review and perfect the design; streamline construction process and assist in asset management. These bring along increased productivity and better integration in the building life cycle.

To help the construction industry better reap the benefits of BIM, the Government mandated the use of BIM in major government capital works projects of value over \$30 million starting from January 2018. The feedback has so far been overwhelming - 224 consultancy agreements/works tenders with BIM adoption had been invited, out of which 162 had been awarded at a total contract sum of \$113 billion.

In a bid to encourage local construction firms to wider adopt BIM and build up their technical capacity, the Construction Innovation and Technology Fund (CITF) provides financial assistance for them to attend BIM training and procure BIM hardware/software. As at end 2019, the CITF approved 519 BIM-related applications at a funding subsidy of over \$50 million.

A local start-up, MDM Group Inc. Ltd. (MDM), was pleased to share with us how the CITF assisted them in the roadmap of BIM adoption. Founded in late 2014, MDM is a Hong Kong based start-up specialising in construction technologies and techno-centric building development including BIM consultancy. Mr Kevin NG, director of MDM, appreciated much that the CITF had helped them remove financial obstacles in BIM adoption. With 70% grant, procurement of BIM hardware and software become much more affordable for start-up firms.

Convinced of the huge benefits brought by BIM, MDM took initiative to run BIM for building projects even though it was not stipulated in the contract requirements. Its CEO, Mr Billy CHU, went on to illustrate their BIM services with a real-life example - construction of a public toilet near San Wan Village in Wong Chuk Hang. The scope of services included construction of BIM models for architectural, structural and building services designs, multi-disciplinary coordination, clash analysis and project scheduling, etc. Through MDM's application of BIM in the project, clients recognised the benefits of BIM such as enhanced communication, increased productivity and reduced construction waste. Mr NG said it was also a pleasure and achievement to see clients' change in mindset towards BIM - from "need to do" to "keen to do" after realising its benefits.



發展局
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CONSTRUCTION INDUSTRY COUNCIL
建造業議會



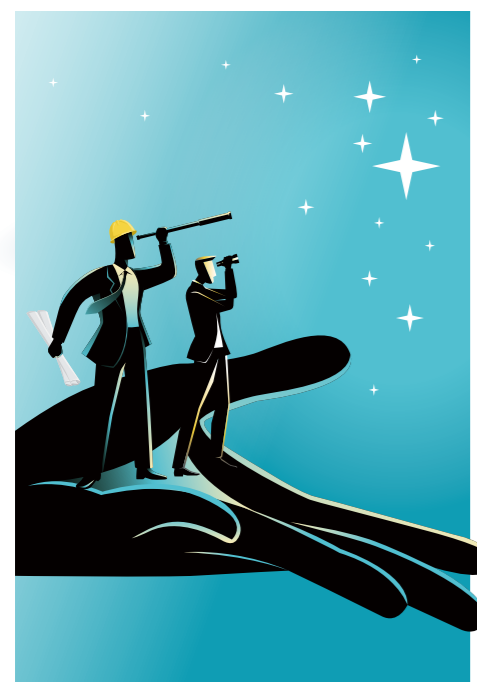
人力發展 MANPOWER DEVELOPMENT

政府設立建造業創新及科技基金(基金)，旨在鼓勵建造業界更廣泛採用創新建築方法及先進科技。然而，科技始終須由人來應用。若沒有人才策劃，科技再創新亦是徒然。為了培育更多人才應用科技，基金資助現有從業員和有意成為建造業專才的人士參與相關人才培訓活動。

接下來，香港建造商會和香港理工大學會與我們分享他們在基金的支持下，遠赴美國和意大利接受海外培訓的經驗。

The Construction Innovation and Technology Fund (CITF) is established with the purpose of encouraging a wider adoption of innovative construction methods and advanced technologies in the construction industry. But technologies are applied by human. Without talents serving as the master mind, technologies will not bring about their intended benefits. To train up our people to harness technologies, the CITF supports existing practitioners and prospective built professionals to take part in relevant manpower training.

Later on the Hong Kong Construction Association and the Hong Kong Polytechnic University will share with us their experience in conducting overseas training to the United States and Italy under the auspices of the CITF.



刻不容緩 It's Now or Never

過去幾十年，香港向世界展示了在興建超大型基建設施(包括香港國際機場和青馬大橋等標誌性建築)方面的專業技術。然而，我們現時仍沿用數十年前的方法來應對建造業施工期緊迫和勞工短缺等挑戰。究竟這能否應付行業不斷轉變的挑戰？如果不能，下一步又應怎樣做？

科技及創新樞紐參觀之旅讓人眼界大開

香港建造商會青年會的年青專業會員得到基金資助，派出考察團遠赴波士頓和紐約進行為期七天的交流。是次活動重點之一，是造訪以駐場計劃形式營運的歐特克科技中心(Autodesk Technology Center)，計劃旨在把構思變為現實。該中心會評估不同申請者的構思，如認為某一構思可行，便會為申請者提供免費工作場地和設備，協助他們實踐創意。舉例來說，創新3D打印技術已應用於模板製作，而模板則可用作結構的組成部分，並不需要拆除，從而避免混凝土表面出現缺損。

建築物料的選擇

考察團與賈維茨會議中心擴建項目(Javits Center Expansion)和塔潘齊大橋項目(Tappan Zee Bridge Project)的代表會面。無獨有偶，兩個項目的主要承建商對選用建築物料抱有相同的看法。考慮到結構保養問題，他們計及物料的使用周期後，選擇用鋼材來代替原來的鋼筋混凝土設計。相反，本港建造業很少會考慮「新解決方案」，而是遵循沿用已久的解決方案，導致建造業科技自九十年代起一直停滯不前。

與時並進

去年，香港首次以「組裝合成」建築法(MiC)興建建築物，工程已正式動工，而建造業亦正積極推廣採用建築信息模擬(BIM)。為了推動建造業更蓬勃發展，業內所有人士，上至管理層下至畢業生，都需要攜手協力應用不同的創新科技。此事刻不容緩，大家不要再等了，今天就一起行動吧！

林晞琪小姐

香港建造商會青年會 年青專業委員 / 見習工程師 禮頓建築(亞洲)有限公司

啟蒙之門 Door of Enlightenment

基金致力鼓勵建造業從業員及專上學生不斷追求專業知識，特別是創新的建造科技。《Star Trek》的James Kirk隊長鼓勵眾人「勇往前人未至之境」。基金給我難得的機會，讓我在千里之行踏出堅實的一步，跟教授和24名同學遠赴意大利，參加2019年7月14至20日舉行的「The Computing in Construction Summer School 2019」。在這次活動中，我們不但深入了解建築業最新的創新科技及對業界發展的影響，還有機會與世界各地的教授和博士生作學術交流，引發思考，令考察學習之旅更多姿多彩。

點燃建造業創新火花

有幸第一次與建造業專家在學術環境中交流互動，我不但心情興奮，而且亦增長知識，受到啟發。這次研討會亦提供平台，讓我們更了解建築與創新科技之間密不可分的關係。知名教授向我們講解建造工程如何結合人工智能、區塊鏈等科技，提升



In the past decades, Hong Kong has showcased the world our expertise in delivering mega infrastructures such as the icon-like Hong Kong International Airport and Tsing Ma Bridge. However, the approaches we currently adopt to tackle construction challenges like tight schedule and labour shortage remain similar to those used decades ago. To deal with ever-changing challenges, is that enough? If not, what's next?

An Eye-opening Trip to Technology and Innovation Hub

Funded by the CITF, Hong Kong Construction Association Young Members Society Professionals Connection sent a delegation to Boston and New York for a 7-day exchange. One of the highlights was a visit to Autodesk Technology Center run by a Residency Program striving to bring ideas to life. After assessment, the Centre would provide free workplace and equipment to participants with probable ideas for them to transform their creativity into reality. For example, Innovative 3D printing technology was applied in the printing of formwork in which dismantling of formwork is not required and defects on the concrete surface can be avoided.

Approach in Material Selection

Delegates spent time with representatives from Javits Center Expansion and Tappan Zee Bridge Project. Coincidentally, the main contractors of both projects shared the same thoughts on material selection. Taking into account the maintenance of the structure, they adopted a life cycle approach and replaced original reinforced concrete by steel. On the contrary, seldom do we consider 'new solutions' but follow the long-proven methods of the solution in Hong Kong, thus the construction technology has remained stagnant as the 90s.

Be a Change-maker

The construction of the first Modular Integrated Construction (MiC) building commenced in Hong Kong last year and we are now catching up with the pace of Building Information Modelling (BIM) application. Regardless of your position in the hierarchy - a director or a fresh graduate, we need to jointly contribute to the flourishing of the construction industry. It's now or never!

Ms. AK LAM

HKCA YMS Pro Committee
Graduate Engineer - Leighton Contractors (Asia) Limited



生產力和工地安全，內容之廣完全超出我想像。我們與其他研究生就相關建築科技深入交流和發表意見，啟發我思考在香港應用建築科技的可能性。

內在影響及改變

學習是創造未來無限可能性的根源。感謝基金為我們提供機會站在「巨人肩膀」上，看得更遠。我想起了《Star Trek》電影中另一句對白：「提升硬件，生產力可能提高一倍；培育人才卻會帶來千倍回報。」期望我們可把吸收到的知識學以致用，為香港建造業的未來出一分力、發一分光。

林永豪

香港理工大學測量學系三年級生



The CITF is committed to supporting industry practitioners and tertiary students in their pursuit of professional knowledge, particularly in innovative construction technologies. While Captain James Kirk of Star Trek encouraged people "to boldly go where no man has gone before", the CITF granted me a hard-earned opportunity to begin the thousand-mile journey with one concrete step - partaking in "The Computing in Construction Summer School 2019" in Italy during 14-20 July 2019 with my professors and 24 classmates, where we delved into the cutting-edge construction technologies and their future impacts. The thought-provoking exchanges with professors and PhD students from around the globe added colours to the study tour.

Sparks of Innovation in Construction Industry

First time indulging in such a highly interactive academic environment with construction experts enriched us with a wealth of excitement, knowledge and inspirations. The conference provided us with a platform to better understand the connection between construction and innovations. The lectures given by renowned professors on how the integration of construction and technologies like A.I. and blockchain uplifted productivity and enhanced site safety were to be honest beyond my wonders. The in-depth discussion and the elevator pitch we had with other postgraduates on respective construction technologies were also inspiring enough to trigger my thoughts on the possibilities of adopting them in Hong Kong.

Influence and Change from Within

Learning is always the starter of every possibility in the future. Thanks to the CITF, I could see further by standing on the shoulders of giants. I recalled another Star Trek quote that "improve a mechanical device and you may double productivity. But improve man, you gain a thousand fold". I hope the knowledge we acquired can better equip us to contribute to the future of Hong Kong's construction industry.

LAM Wing Ho

Year Three Surveying Student,
The Hong Kong Polytechnic University



彈指之間 為工程把脈

Take the Pulse of Construction Projects at Fingertips

即使足不出戶，仍能安坐辦公室中運籌帷幄管理工程項目，現在已不再是夢想了。倬詠技術拓展有限公司研發的「融合實境平台」(Hybrid Reality Platform) (HRP)讓你一機在手，便能指點江山！

HRP是專為建築項目而設的綜合管理平台，兼容多種空間資訊格式，例如建築信息模型(BIM)、實境模型、地理信息系統(GIS)、點雲、360全景照片及物聯網數據。項目擁有者只需使用單一系統，便能在整個項目的生命週期中管理複雜的工地環境。

4D追蹤施工進度

工程經理往往希望能密切監督施工進度，確保項目按照既定的範圍、預算、時間及質量要求進行。過去，我們須指派技術人員到工地實地拍照。現在，我們只須運用HRP「4D追蹤施工進度」功能，便能在四維空間介面上仔細巡視整個工地，即使難以到達的角落亦通行無阻。HRP配備時間軸功能，讓用家可翻查不同時間的工地情況，還可用並列方式，比較已建成部分與原來設計有否偏差。此外，系統的「空間格局優化」功能可預先模擬施工程序，並能及早發現潛在問題；而甘特圖表(Gantt Chart)分析功能則有助優化工作次序。HRP能讓各項工序準時完成，亦把成本及風險減至最低。

數碼轉移

各行各業現正推行數碼化轉型，建造業亦不例外。企業紛紛投資數碼科技的應用，以優化作業流程，由填報表格、勘察工地以至草擬合約。HRP為資料提供統一平台，協調雲端的工作流程及文檔管理，無論是純文字或多媒體文件，均獲系統鎖定實際地理位置。只要在電腦安裝HRP，項目各持份者便可隨時隨地一同建立、儲存和翻查資料，不受任何限制。

為了增強以用戶為中心的體驗，HRP已可延伸至應用於AR/VR互動裝置及沉浸式4D CAVE中，同時容許多個用家進行溝通和解決問題。

HRP一舉多得，既提升生產效率及建造質素，亦能改善工地安全，你是否躍躍欲試呢？HRP已納入基金的預先批核名單。請立即行動，向基金申請資助，讓這個多功能的協作系統助你一臂之力，開展你的建造大計。

倬詠技術拓展有限公司



It is no longer a dream to just sit back and relax in an office while tapping the pulse of any construction projects. The CHAIN Technology's Hybrid Reality Platform (HRP) puts them right at your fingertips!

Being compatible with most of the spatial information models such as BIM, Reality Model, GIS, Point Cloud, 360 panoramic photos and IoT data, the HRP is a unified platform for project owners to manage a complex site throughout the entire project lifecycle.



4D Tracking of Construction Progress

Project managers yearn to keep track of everything in the construction process to make sure that the project is within scope and budget, on schedule and of good quality. It used to be a brick-and-mortar task accomplished by technicians taking photos at the site. The HRP is the game changer. Our 4D Progress feature enables users to visualise and tour around the site in detail, even for inaccessible places. The "timeline" function also empowers users to keep chronological records and compare side-by-side the as-built scenes with the design. Together with the spatial optimisation feature which facilitates simulation of construction progress and early identification of potential hiccups as well as the Gantt Chart Analysis which helps optimise sequenced tasks, HRP keeps everything run on time at minimised costs and risks.

Digital Transformation

Digitisation has been a driving force in business transformation and so is for the construction industry. Corporates invest in digitisation to achieve seamless workflows, from submitting forms to conducting surveys to drafting contracts. HRP can serve as a single source of truth for workflow and file management on cloud, not only contextual documents but also multi-media files georeferenced to the actual location. With HRP installed on devices, project stakeholders can co-create, store and check the information they want anytime and anywhere.

For more enhanced user-centric experience, HRP is made extendable to AR/VR interactive applications and 4D Immersive CAVE for communication and problem-solving among multiple users.

Eager to experience first-handedly the benefits of enhanced productivity, better build quality and improved site safety? HRP is on the pre-approved list of the CITF. Apply to the CITF to start your construction projects with the comprehensive collaboration system.

CHAIN Technology

「建造業創新及科技基金」申請數字節節上升 CITF application figure is rising

由2018年10月至今已收到逾一千一百份申請，當中八百多份申請已經成功獲批，總資助額逾港幣一億八千二百萬元。
Counting from October 2018, the application number has reached more than 1,100, of which over 800 applications have been approved. The funding grant amounts to more than HK\$182 million.



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