… 中連科工

SNART & OFF-SITE VANUE AND FACTOR ING FOR MIC

支撑发展创新引领未

Tony Ma 马帅 Director of Overseas Division China Construction Science and Industry Co., Ltd.

▲ 企业简介 Company Overview

中建科工 (CHINA CONSTRUCTION SCIENCE AND INDUSTRY CO., LTD.)

中建钢构 (CHINA CONSTRUCTION STEEL STRUCTURE CO., LTD.))



Affiliated to CHINA STATE CONSTRUCTION ENGRG CORP LTD.

(The world's largest investment and construction group, ranked 9th in the world's top 500)

中国最大的钢结构产业集团 (The Largest Steel Structure Industry Group in China)

国家高新技术企业(National High-Tech Enterprise)

▲ 企业简介 Company Overview



- Five modern steel structure fabrication plant with annual production capacity exceed 1.2 million tons in mainland China. Also set the plant in Dubai and Algeria, and the Egypt plant will open next year.
- Ranking first in the structure steel industry for ten consecutive years in China.
- Plant have passed the verification of European standard, American standard and Japanese standard.

The construction industry is a vital sector in the economy of Hong Kong, employing almost half a million workers. Based on the forecast by the Construction Industry Council in December 2017, annual construction expenditure will exceed \$250 billion, or approximately 5% of GDP, within the next 5 years. The construction industry has an essential bearing on the economic growth and long-term development of Hong Kong, and the livelihood of its people. However, it is facing some challenges in recent years:

- Shortage and ageing of the labour force affecting productivity
- High construction cost
- Demands for better safety, quality, and environmental friendliness in construction

The situation will become worse in the next few years as the demand for construction services continues to rise. It is time to find ways to enhance productivity for the construction industry's future.

we believe that MIC is the direction of the future, based on almost 40 years experience in the field of structure steel, and the company began to deploy STEEL MIC business in 2020.

Why MiC



聚焦两大产品方向 Focus on two major product directions



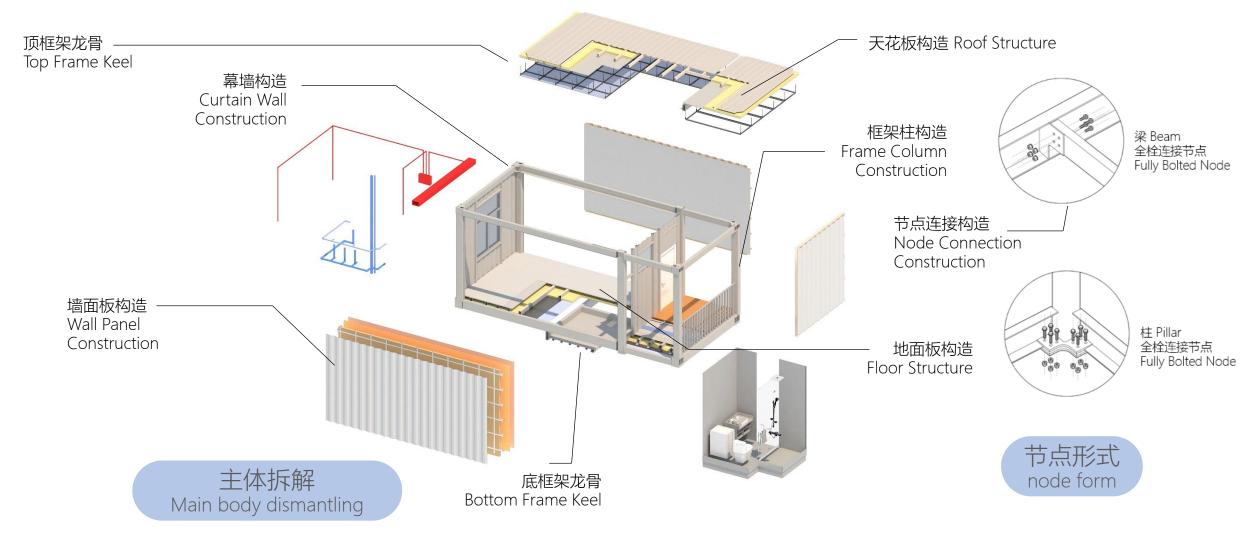




自研 MiC 技不体系 Self-developed MiC technology system

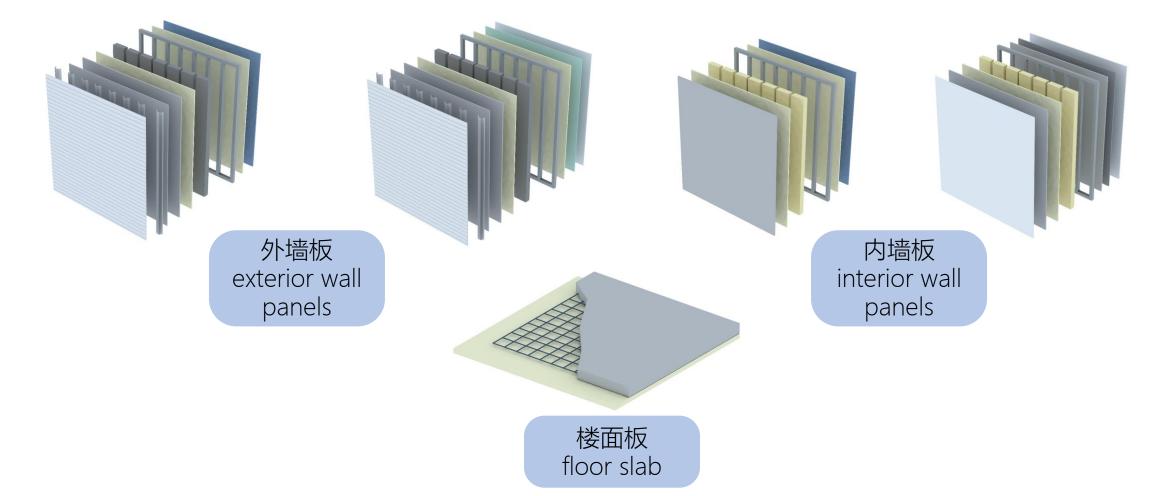
成熟技术体系 Mature technology system

• 以钢结构框架为主体, 定位为永久性建筑 (With the steel structure frame as the main body, positioning as a permanent building)



成熟技术体系 Mature technology system

• 集成墙板和装修,适配市场绝大部分建材,选择丰富度较高,完成后与传统建筑体验一致 (Integrated wall panels and decoration, suitable for most building materials in the market, rich in choice, consistent with traditional building experience after completion)



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分阶段 实现自动化 Automate in phases



材料阶段 material stage 全自动 Fully Automatic



结构阶段 structural stage 装潢阶段 decoration stage

半自动

semi-automatic



产品化 Commercialized

FAC

端链贯通,全阶部署升级交付形态 End-to-end chain connection, full-stage deployment and upgrade delivery form

打通制造的全阶段、全要素,从材料到构件,从构件到完整产品,生产能力部署覆盖结构、装修、机电、幕 墙等专业和阶段,真正实现<mark>拎包入住、到手即用</mark>的成品交付形态

Get through all stages and elements of manufacturing, from materials to components, from components to complete products, production capacity deployment covers structure, decoration, electromechanical, curtain wall and other specialties and stages, and truly realize the ready-to-use finished product delivery form



FAC 自动化 Automation

行业首家以非标(特箱)自动化工程装备设计理念研发设计模块化生产线,大量采用高精度伺服、丝杆等结构及一键联动控制程序,整体效率提升50%以上

The first in the industry to develop and design a modular production line based on the design concept of non-standard (high cubic container) automation engineering equipment. A large number of high-precision servos, screw rods and other structures and one-key linkage control programs are used, and the overall efficiency is increased by more than 50%.

制造精度行业领先:

Industry-leading manufacturing precision

• 长宽高误差 0~-2mm;

Length, width and height error 0~-2mm

• 对角线绝对值 0~5mm;

Diagonal absolute value 0~5mm



装配自动化 Assembly automation

生产效率行业领先:

Industry-leading production efficiency

• 结构效率是传统特箱生产线的1.5-2.0倍;

The structural efficiency is 1.5-2.0 times that of the traditional high cubic container production line

油漆单工位出箱效率是传统的5倍(烘房出箱节拍45-60min/台);

The box-out efficiency of the paint single station is 5 times that of the traditional one (the box-out cycle of the drying room is 45-60min/unit)



物流自动化 Logistics automation



焊接自动化 Welding automation

柔性化 Flexibility

FAC

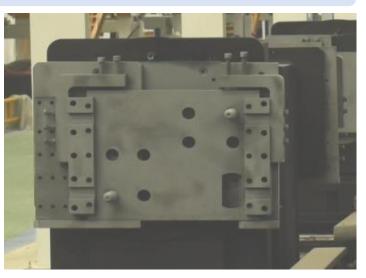
规格弹性大:长度、宽度、高度三向空间可变,覆盖**主流市场85%**以上产品规格尺寸

Large specification flexibility: length, width and height are variable in three directions, covering more than 85% of the mainstream market product specifications and sizes

- 长度: 6m-16m; Length:6m-16m
- 宽度: 2400-4200mm; Width: 2400-4200mm
- 高度可变最大4200mm; Variable height up to 4200mm

柔性工装设置 Flexible Tooling Setup





产线宽度自动调节 Automatic adjustment of production line width 装配柔性夹具 Assembling the flexible fixture 角柱万能柔性夹具 Corner column universal flexible fixture

FAC 智能化 Intelligent

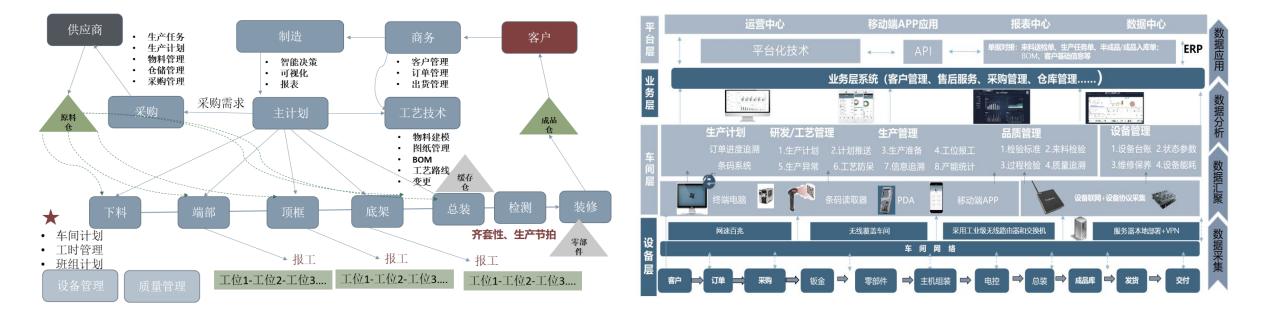
信息加持,一体化平台支撑管理决策 Information blessing, integrated platform supports management decision-making

管理智能化:依托MES全生命周期信息化管理平台,实现箱体从加工制造到现场安装**全过程管理数据化、**

可视化, 订单、制造、能源管理系统协同互融

Intelligent management: Relying on the MES full life cycle information management platform, realize **the digitalization and visualization of the whole process management** of the cabinet from processing and manufacturing to on-site installation, and coordinate and integrate order, manufacturing and energy management systems

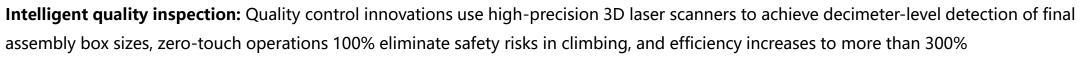
- 订单信息化管理-Order information management
- 制造 全生命周期管理- Manufacturing Full Lifecycle Management
- 能像系统应用-Energy Energy Type Image System Application



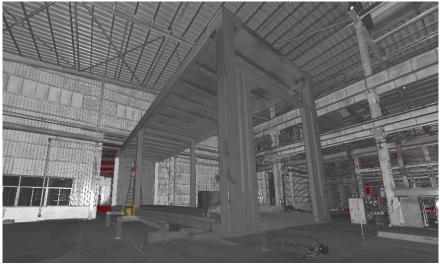
智能化 Intelligent

技术赋能,三维点云提升交付品质 Technology empowerment, 3D point cloud improves delivery quality

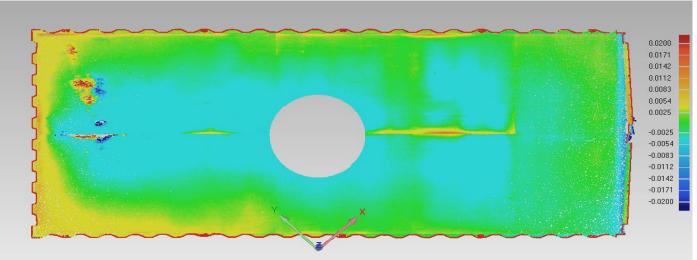
质检智能化:品控创新试用高精度三维激光扫描仪,实现总装箱体尺寸**分米级检测,零接触作业** 100%消除登高安全风险,效率提高至300%以上



- 8000万像素全景影像,扫描速度100万个点/秒;
- 生成总体 < 1mm一个点采样间隔的高密度点云;
- ▶ 100%避免了人员登高拉尺测量的安全风险; 100% avoid the safety risk of people climbing up and drawing a ruler to measure
- 测量精度 < 1mm; Measurement accuracy < 1mm
- 测量时间3-5min/台箱; Measuring time 3-5min/box



箱体三维成像点云模型 Box 3D imaging point cloud model



80 million pixel panoramic image, scanning speed 1 million dots/second

Generate a high-density point cloud with a point sampling interval of less than 1mm

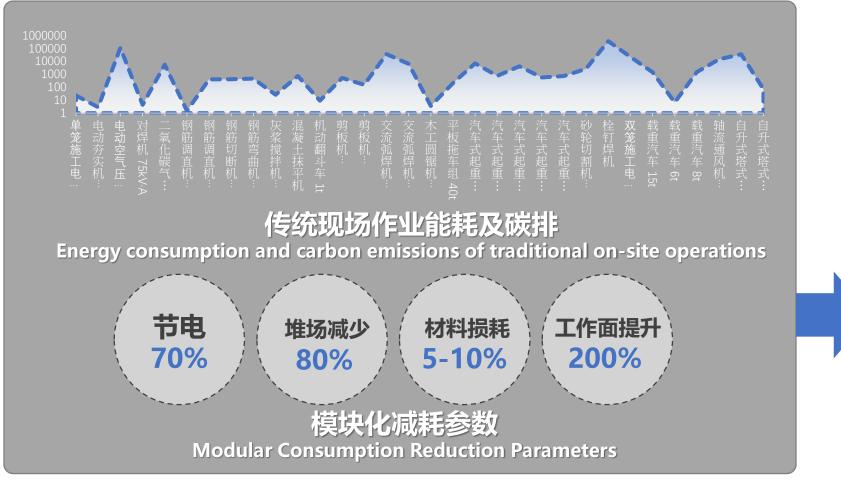
箱内地板平整度检测 Flatness detection of the floor in the box

FAC 减排化 Emission Reduction

作业前置,全工厂制造促减排降碳 Pre-operation, whole factory manufacturing promotes emission reduction and carbon reduction

减排降碳:预制装配率高达95%,使现场施工作业绝大部分前置,降低92%的建筑建造阶段二氧化碳排碳量

Emission reduction and carbon reduction: The prefabricated assembly rate of modular buildings is as high as 95%, so that most of the on-site construction operations are carried out in advance, reducing 92% of the carbon dioxide emissions in the construction phase of the building





有产品、有体系、有产线,技术的成熟最终归于 中建科工MIC项目实践

There are products, systems, and production lines, and the maturity of technology is ultimately attributed to the practice of the MIC project of CCSIC





公寓/酒店 Apartment/Hotel

模块化 传统建筑 Modular Traditional Building

ME 项目概况 Project Overview

深圳会展国际酒店



深圳会展国际酒店项目 Shenzhen Bay Area International Hotel

Buildings A1-A5 are all 7 floors with a total construction area of 59,000 m².
Total Construction area: 310,000 m².
Duration: Total 115 days / Mic-70 days







エ厂加工照片 Factory processing photos



工厂完工照片 Completed photos of the factory



软装陈设照片 Soft Furnishing Photos







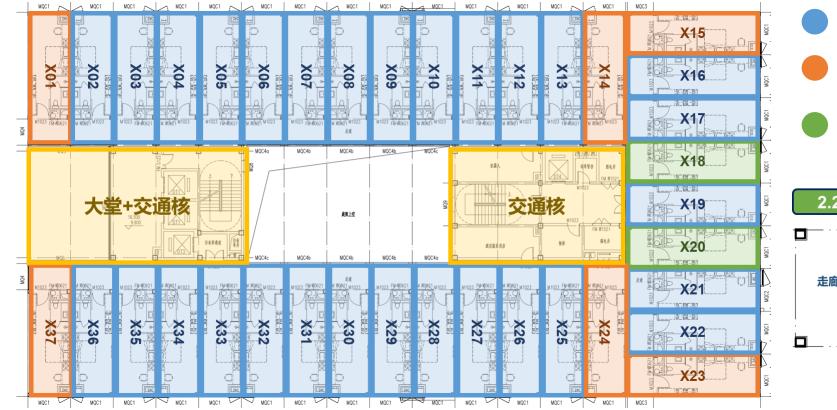
现场吊装照片 On-site hoisting photos 主体完工照片 Main finished photo 投入使用照片 Put into use photo

参标准化设计 参 Standardized Design

建筑标准化 Building Standardization

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- A1-A4栋酒店均采用箱框体系, A5栋为纯模块叠箱体系, 无交通核, 模块合计1288台箱。(国内最大)
- 标准模块占比80%,剩余20%模块变化率不超过5%
- The hotels in buildings A1-A4 all adopt box-and-frame system, and building A5 is a pure modular stacking system without traffic cores, with a total of 1,288 boxes. (the largest in China)
- Standard modules account for 80%, and the change rate of the remaining 20% modules does not exceed 5%.



29台标准箱 29 TEUs

- 6台山墙箱(帯斜撑) 6 gable boxes (with diagonal braces)
- 2台特殊箱 (少柱) 2 special boxes (less columns)

深圳会展国际酒店

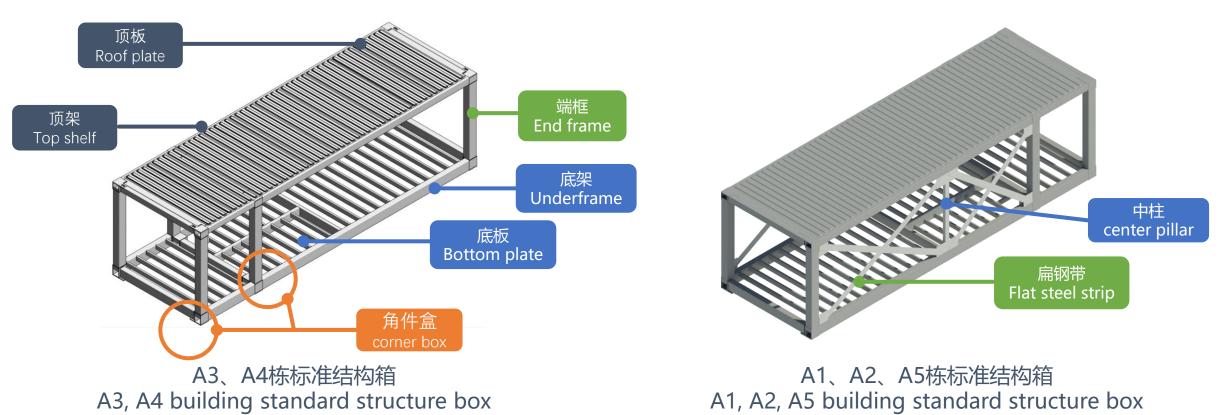


结构标准化 Structural standardization

- 标准结构箱包含角件盒12个、端框3组、顶架2组、底架2组、顶板1块(波纹板)、底板1块(镀锌板);
- 标准箱型构件规格外轮廓、角件节点<mark>基本一致</mark>,随建筑高度方向,主要调整板材<mark>壁厚</mark>;
- 装修、机电设计几乎不受结构变化影响

ME

- The standard structural box includes 12 corner boxes, 3 sets of end frames, 2 sets of top frames, 2 sets of bottom frames, 1 piece of top plate (corrugated plate), 1 piece of bottom plate (galvanized plate);
- Standard box-shaped components have basically the same specification outline and corner joints, and the wall thickness of the plate is mainly adjusted along with the height of the building;
- Decoration, mechanical and electrical design is hardly affected by structural changes



装饰装修标准化 Decoration standardization

深圳会展国际酒店

- 幕墙全部采用单元式幕墙,箱体部分的在工厂预装,规格完全一致•
- 现场收口部分铝板,模数相同

ME

The curtain walls are all unitized curtain walls, and the box part is preinstalled in the factory, and the specifications are exactly the same The aluminum plate of the on-site closing part has the same modulus



装饰装修标准化 Decoration standardization

深圳会展国际酒店

- 内装基层、面层材料(墙面、天花)标准模数全部为600mm, (地板)标准模数为410mm
- The standard modulus of interior base and surface materials (wall, ceiling) is 600mm, and (floor) standard modulus is 410mm



ME





全专业集成 Full professional integration

- 房间内机电系统、室内装修、整体卫浴、幕墙单元板块;
- 走廊基层装修;

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- 单箱室内外防水。
- In-room MEP system, interior decoration, overall bathroom, curtain wall unit plate;
- Corridor primary decoration;
- Single box indoor and outdoor waterproof.

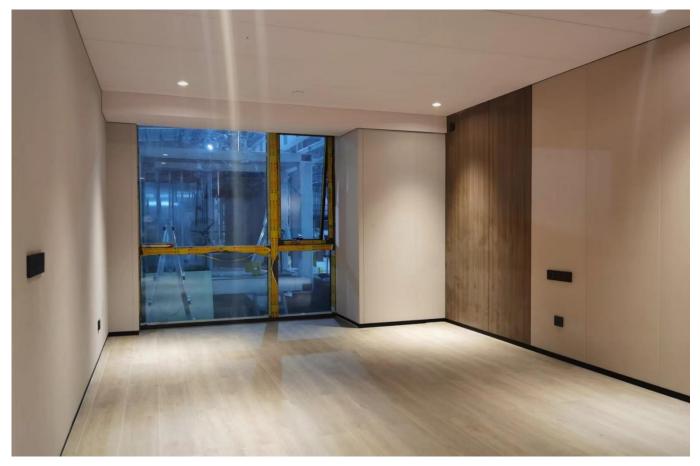


深圳会展国际酒店

ME 全预制交付 Fully prefabricated delivery

深圳会展国际酒店

- 客房模块完成全部的结构、机电、装修等专业施工,包括热水器、空调、新风、智能化等设备,达到
 包入住的标准
- The guest room module completes all professional construction such as structure, electromechanical, and decoration, including water heaters, air conditioners, fresh air, intelligent equipment, etc., to meet the standard of fully furnished



客房内全部完成 Complete in room

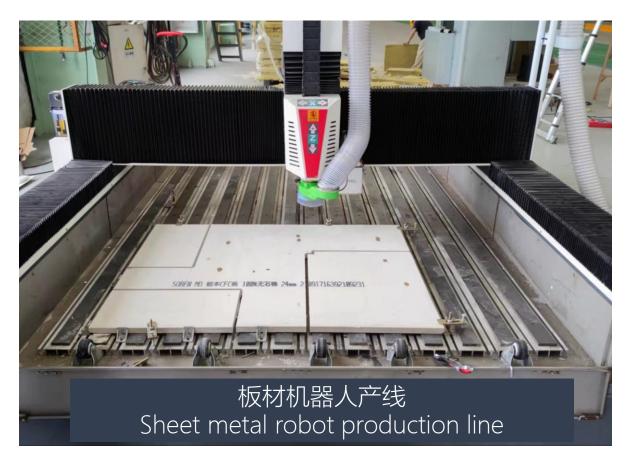
ME 机器人制造 Robot manufacturing

深圳会展国际酒店

- 主体结构(钢结构) 生产采用自动化产线制造, 墙板、轻钢龙骨等部品由智能化机器人制造并预拼完成
- The main structure (steel structure) is manufactured by the automation production line, and parts such as wall panels and light steel keels are manufactured by intelligent robots and pre-assembled



箱体自动化产线 Box automation production line

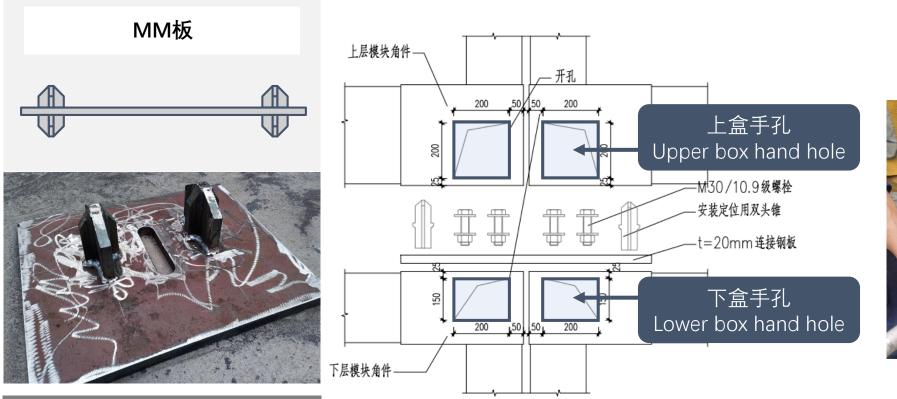






层间连接(MM) Inter-layer connection

- 模块箱体之间连接以角件盒作为核心构件, 全部采用高强螺栓连接, 无需焊接和灌浆, 加速现场安装效率
- The corner box is used as the core component for the connection between the module boxes, all of which are connected by highstrength bolts, without welding and grouting, which speeds up the efficiency of on-site installation





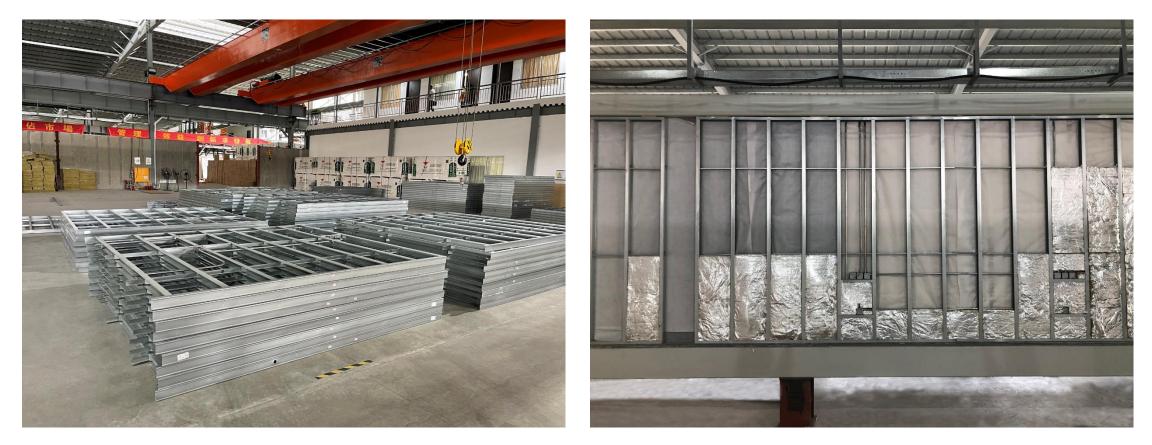
深圳会展国际酒店

全干式工法 Full-dry method

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深圳会展国际酒店

- 模块箱体的墙面、地面、天面均采用波纹板、水泥纤维板+轻钢龙骨复合构造,无混凝土浇筑。
- The wall, floor and sky of the module box are all made of corrugated board, cement fiber board + light steel keel composite structure, without concrete pouring.

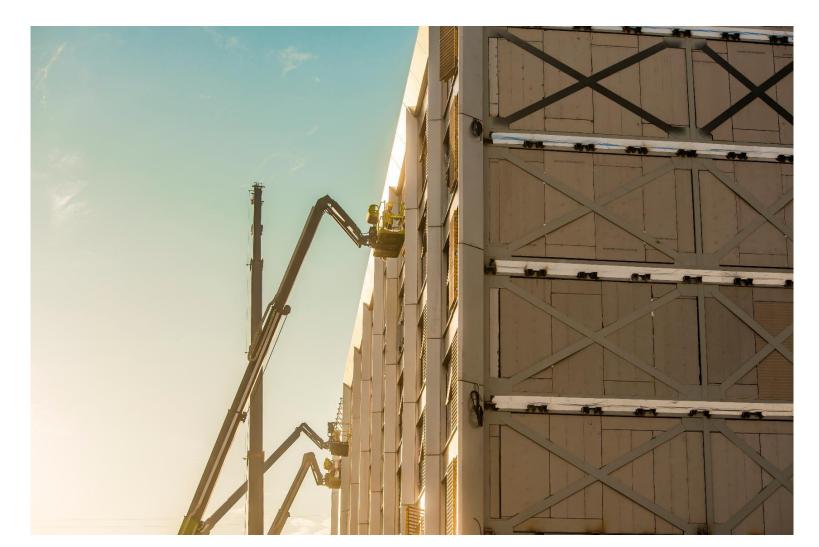


轻钢龙骨复合墙体地面预拼,整体安装 Light steel keel composite wall and ground pre-assembled, overall installation

ME 全机械安装 Full mechanical installation

深圳会展国际酒店

- 现场无外架设置、全部采用履带吊、举升车完成吊装、安装作业
- There is no external frame setting on site, and all the hoisting and installation operations are completed by crawler cranes and lift trucks





一体化卫浴 Integrated bathroom

• 标准客房100%采用整体卫浴;

ME

- 采用预贴瓷砖的一体式底盘,以及金属一体式的墙板
- 100% of the standard rooms adopt the whole bathroom
- One-piece chassis with pre-tiled tiles, and metal one-piece wall panels



瓷砖预铺贴底盘 Tile pre-paved chassis



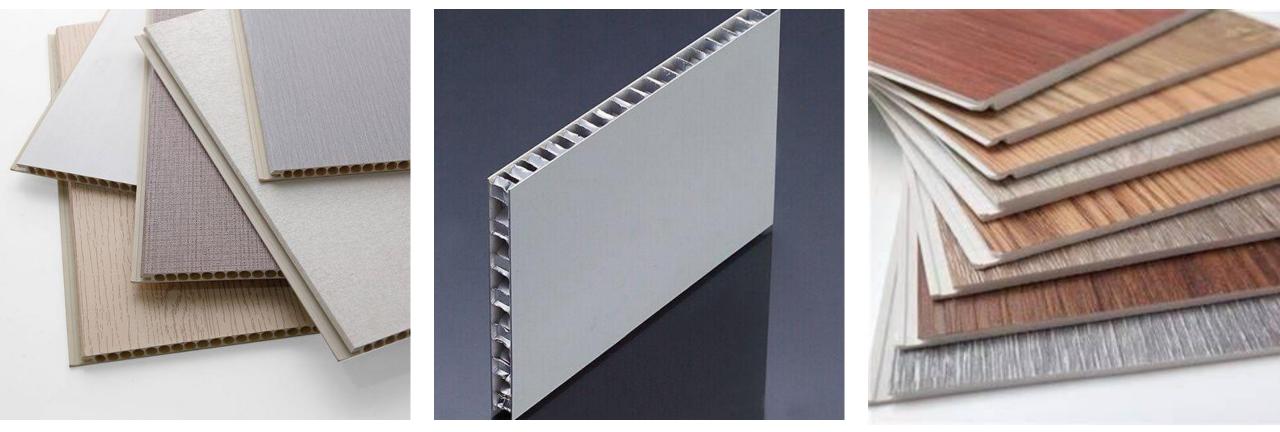
整体卫浴金属一体板 Whole bathroom metal integrated panel

一体化面板 Integrated panel

深圳会展国际酒店

- 墙饰面板为竹木纤维板+膜印技术,可以实现金属、瓷砖、布纹等复合纹理
- 天花采用复合蜂窝铝板, 替代传统的涂料或湿贴工艺
- 地面全部为SPC石塑地板,安装效率高,平整度好
- 加快施工效率,减少TVOC等污染物释放

- The wall decoration panel is made of bamboo fiberboard + film printing technology, which can realize composite textures such as metal, ceramic tile, and cloth pattern
- The ceiling is made of composite honeycomb aluminum panels, replacing the traditional paint or wet pasting process
- The ground is all SPC stone-plastic floor, with high installation efficiency and good flatness
- Accelerate construction efficiency and reduce the release of pollutants such as TVOC



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墙面-竹木纤维板 Wall-Bamboo fiberboard 天花-蜂窝铝板 Ceiling-Honeycomb Aluminum Panel 地面-SPC地板 Ground-SPC floor

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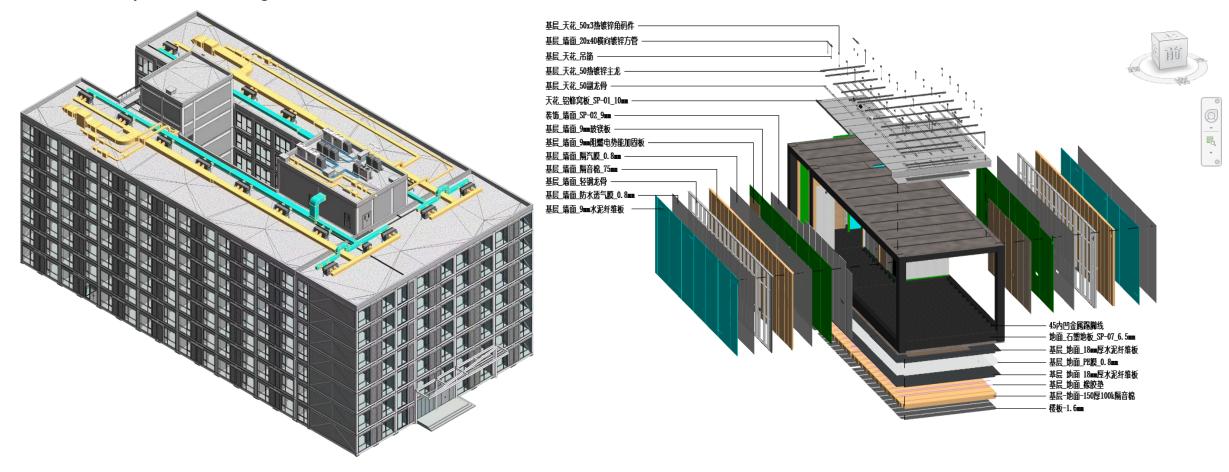
高精度BIM High-precision BIM

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• 项目的BIM全专业模型<mark>深度达LOD400</mark>,精准至螺丝级,有效地指导工厂制造和现场安装

• The BIM full-professional model of the project has a depth of LOD400 and is accurate to the screw level, effectively guiding factory manufacturing and on-site installation

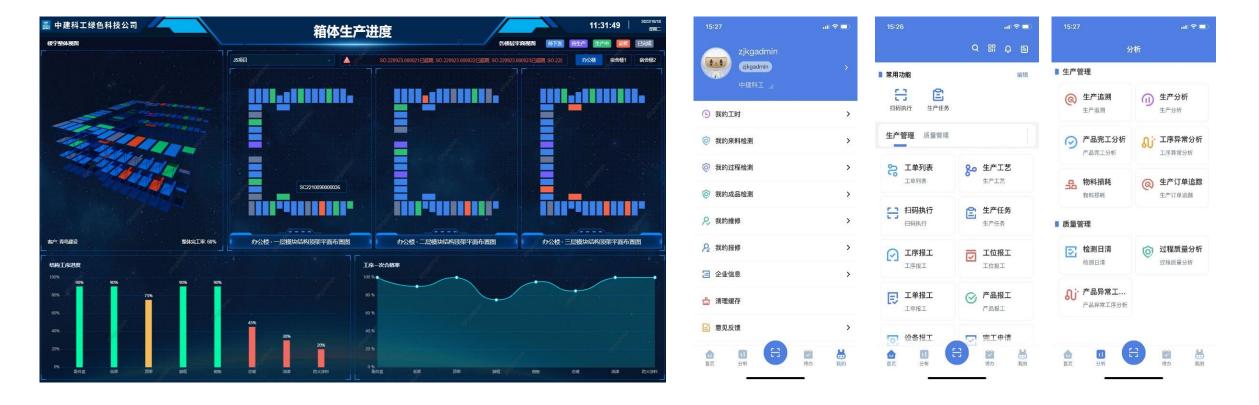
深圳会展国际酒店



数字化平台 Digital platform

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- 现场的数字孪生可视化系统与后台MES生产管理系统相协同,通过二维码进行全流程管理管理,对工厂 制造以及现场安装进行实时的信息采集分析,为项目决策提供依据
- The on-site digital twin visualization system is coordinated with the background MES production management system, and the whole process management is carried out through the QR code, and the real-time information collection and analysis of factory manufacturing and on-site installation are carried out to provide a basis for project decision-making





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应急工程 Emergency Engineering

模块化 Modular 防疫医院 Anti-epidemic Hospital



EMERGENICY HOSPITA

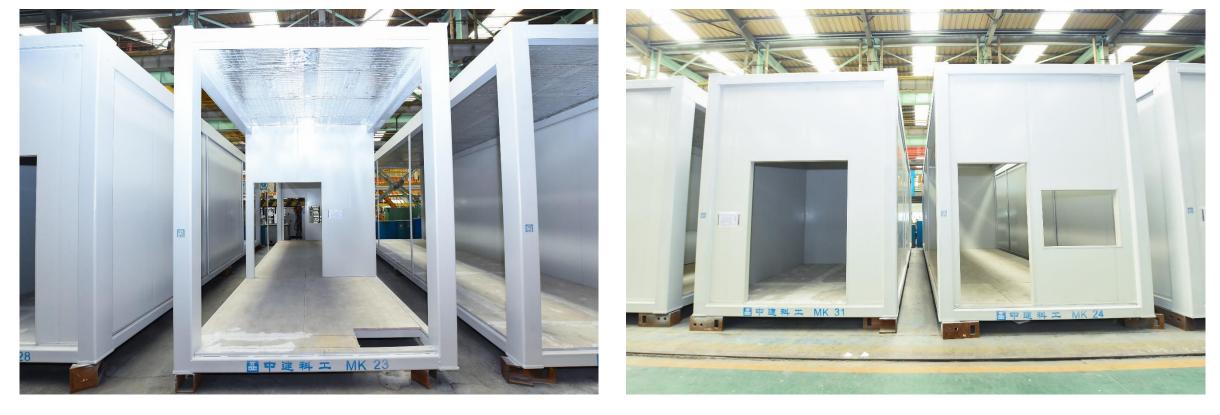
落馬洲河套項目 Lok Ma Chau Loop Project

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 应急医院中的部分设备房(如CT室、MRI室等)因承载要求较大,单位面积承载要求为3KN和8KN。若 采用传统打包箱无法满足,故选用钢结构模块(MIC,轻型)进行施工。

模块化部分

- (案例)单个医疗单元应用36个模块,尺寸为9000mm*2990mm*3700mm(长*宽*高)。
- Some equipment rooms in emergency hospitals (such as CT rooms, MRI rooms, etc.) have relatively large load-bearing requirements, and the load-bearing requirements per unit area are 3KN and 8KN. If the traditional packing box is not enough, the steel structure module (MIC, light) is selected for construction.
- (Case) A single medical unit applies 36 modules, with a size of 9000mm*2990mm*3700mm (length*width*height).

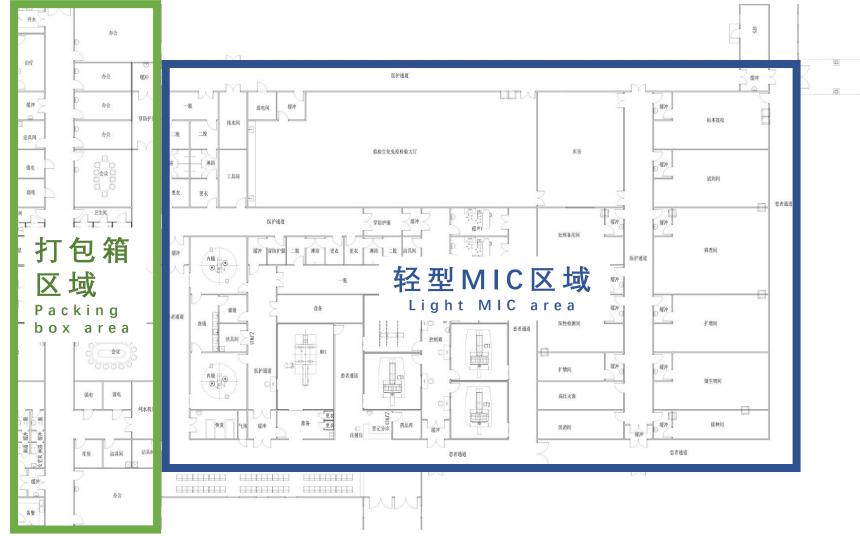


落馬洲河套項目 Lok Ma Chau Loop Project

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放射科及检验科单元 (案例)

Department of Radiology and Laboratory Unit (Case)



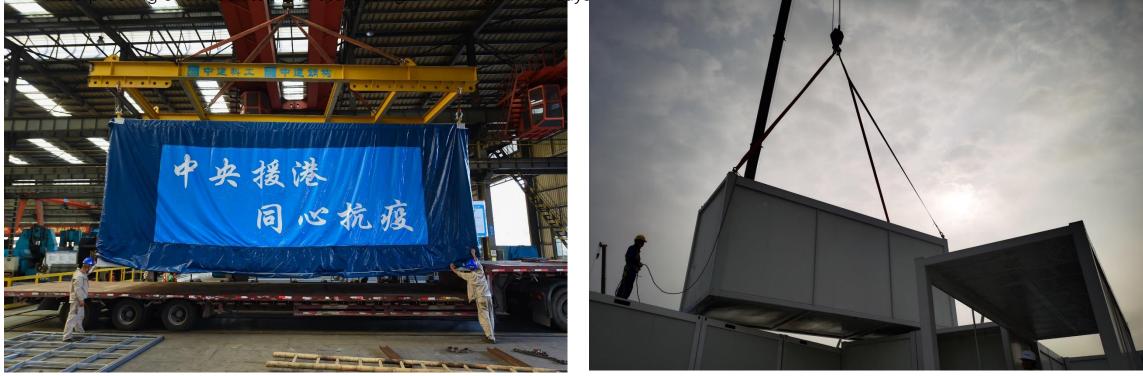
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模块化部分

• 3月6日~3月14日,36台箱体生产周期为9天。

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- 模块化箱体单箱重量约为7t,现场吊装工期为1.5天,平均30min/台,箱顶防水及收边收口作业时间2 天。
- From 6th March to 14th March, the production cycle of 36 cabinets is 9 days.
- The weight of a single modular box is about 7t. The on-site hoisting period is 1.5 days, with an average of 30 minutes per unit. The waterproofing of the box top and the closing of the edge are 2 days





互联网数据中心 Internet Data Center

Chickips.

THE ROOM

模块化 新型设施 Modular New Facility

项目概况 Project Overview

ME

- 模块化数据中心 (MODULAR IDC),已承建2个项目,模块箱体共404个。(包含供电、电池、设备、 交通等模块)
- Modular data center (MODULAR IDC), has undertaken 2 projects, with a total of 404 modular boxes. (Including power supply, battery, equipment, transportation and other modules)



1) 层数 Storey:

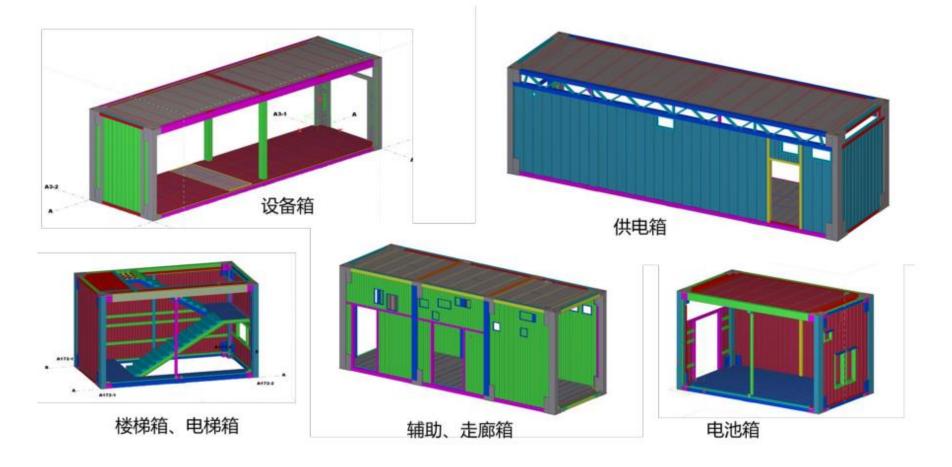
- 地上5层 5 floors above ground
- 2) 箱体数量 Cabinet Quantity:
- 252个箱体+126楼板+60端墙
- 3) 最大尺寸 Maximum size
- 12192mm×3495mm×4150mm
- 4) 单箱重量 Weight of single box
- 单个箱体重量约15.16吨

项目概况 Project Overview

- 与传统建筑不同,以不同设备功能对模块进行区分和分类设计
- 箱体保持相同模数

ME

- Different from traditional buildings, modules are distinguished and classified according to different functions
- The box remains the same modulus



陕西某数据中心

ME 生产制造展示 Manufacturing display

陕西某数据中心



设备箱结构制作 Manufacturing of equipment box structure



设备箱成品制作 Production of finished equipment boxes



设备安装 Device installation

现场成品照片 On-site finished photos

设备安装 Device installation

Hong Kong Market Cases

香港项目案例 Hong Kong Project Cases

1.Hong Kong International Airport Skybridge



Project Name: Hong Kong International Airport Skybridge
Location: Hong Kong
Steel Tonnage: 6,000 tons
Span:160m
Material: S460
Max. steel thickness: 120mm
Work Scope: Design, supply, Fabrication, assembly of structural steelworks

Period:2018-2019

2. Hong Kong International Commerce Center



Project Name: Hong Kong
International Commerce Center
Location: Hong Kong
Total Floor Area: 510,900sqm
Height: 490m, 118-storey
Steel Tonnage: 32,000 tons
Work Scope: Erection of structural steelworks

Period:2006-2008

3. West Kowloon Xiqu Center



Project Name: West Kowloon Xiqu Center
Location: Hong Kong
Steel Tonnage: 6,500 tons
Material: S460
Max. steel thickness: 100mm
Work Scope: Design, supply, fabrication, assembly, delivery to site, and heavy lifting of structural steelworks
Period: 2015-2016



4. Ngong Shuen Chau Exhibition Center



Project Name: Ngong Shuen Chau Exhibition Center
Location: Hong Kong
Steel Tonnage: 3000MT
Work Scope: Design, supply, fabrication , delivery to site and erection of structural steelworks
Period: 2018-2019

5. Kai Tak Sports Park Main Stadium

Project Name: Kai Tak Sports Park Main Stadium
Location: Hong Kong
Steel Tonnage: 20,000 tons
Material: S460
Max. steel thickness: 80mm
Work Scope: Design, supply, fabrication, assembly ,delivery to site and heavy lifting of structural steelworks
Period:2019-present

6. Shek Kwu Chau Integrated Waste Management Facilities



Project name: HKIWMF Location: Hong Kong SteeTonnage:22,000MT Work Scope: Design and Fabrication of structural steelworks Period:2019-present

简约公屋计划 Simple public housing scheme

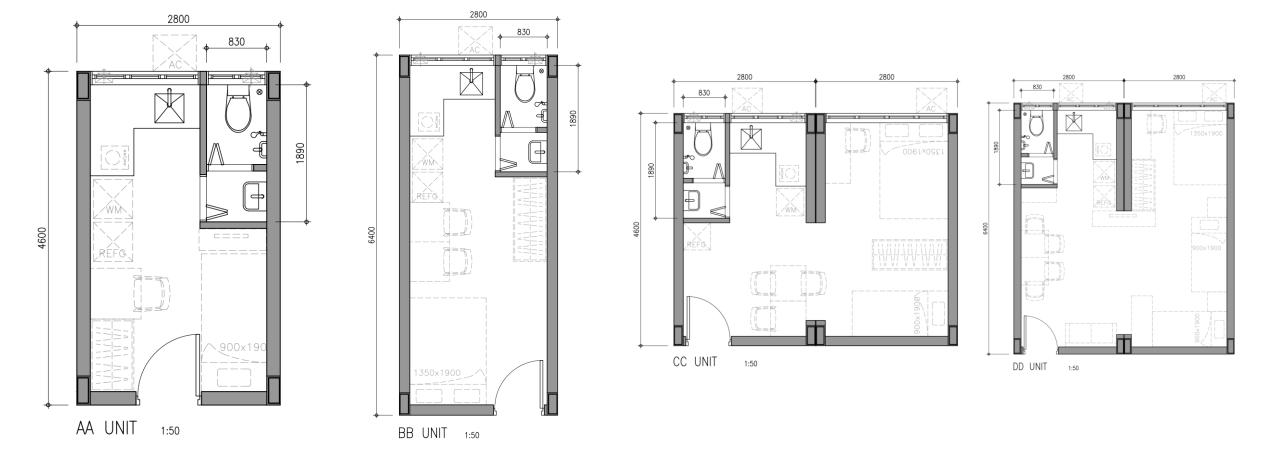
场地	总单元	总MiC模块	楼宇组合(面积详见图纸)				路程距离 - (从HZMB HKP*	建筑高度/楼层 –	MiC模块暂定交付时间		
			AA单元 (4600×2800) (mm)	BB单元 (6400×2800) (mm)	CC单元 (4600×2800) (mm)	DD单元 (6400×2800) (mm)))	建州同戌/役伝 -	起始时间	交付时间	
工包1											
总共:	11500	15170	2360	5470	2290	1380					
场地A	1110	1300	190	730	190	-		3层	2.5个月		
									2024.4	2024.6	
121HD							40km	16层,位于地下原址层顶部一	5.5个月		
场地B 第一阶段	2060	2490	830	800	300	130			2024.10	2025.5	
场地B 第二阶段	8330	11380	1340	3940	1800	1250			12.5个月		
									2024.10	2025.12	
工包2											
<u></u>	10800	14210	2290	5100	2120	1290					
场地C	2110	2480	370	1370	370	-	30km	3层	5个月		
									2024.9	2025.2	
									6.5个月		
场地D 第一阶段	2300	3100	900	600	410	390	— 20km	16层,位于地下原址层顶部		1.2	
									2025.3	2025.9	
场地D									8.5个月		
第二阶段	2980	4050	200	1710	690	380			2025.6	2026.2	
				<u> </u>					4个		
场地E	1850	2340	500	860	290	200	20km	18层,位于地下原址层顶部			
									2025.3	2025.7	
									4个	」 ·日	
场地F	1560	2240	320	560	360	320	45km	18层,位于地下原址层顶部			
									2025.3	2025.7	
工包3											
<u>上回。</u> 总共:	7700	9240	1540	4620	1540	-					
场地G 第一阶段	3500	4200	700	2100	700	-	- 20km -	18层,位于地下原址层顶部	8个	·月	
									2025.5	2026.1	
场地G								16层,位于地下原址层顶部	9.5	<u> </u>	
第二阶段	4200	5040	840	2520	840	-			2025.5	2026.2	

НК

简约公屋计划 Simple public housing scheme HK

AA单元: 4600mm×2800mm

BB单元: 6400mm×2800mm CC单元: 4600mm×2800mm DD单元: 6400mm×2800mm



简约公屋计划 Simple public housing scheme

HK

YOUR REF 朱許唱號: OUR REF 本習唱號: (17) in BD/MiC/220502 FAX 固文傳真: 2523 9380 TEL 電話: 3842 3052 WEBSITE 提壯: www.bd.gov.hk

- 20 June 2022
- China Construction Science and Industry Corporation Ltd. (Attn: Mr. Jiao Bin) Unit 2001-04, 20th floor, 9 Chong Yip Street, Kwun Tong, Kowloon Hong Kong

Dear Sir/Madam,

Letter of In-principle Acceptance (Acceptance Reference No.: MiC 9/2022)

This letter is issued to China Construction Science and Industry Corporation Ltd. to confirm that the Modular Integrated Construction (MiC) system (Model No. CCSIC-MIC-HK-S6-1) as submitted to the Buildings Department (BD) is acceptable in principle for use in private building projects in Hong Kong in respect of the performance aspects listed in Appendix I, subject to the following conditions:

- (i) The design and construction of any building project adopting the above MiC system shall comply with the provisions of the Buildings Ordinance (BO) and its subsidiary legislations;
- (ii) The conditions as set out in Appendix II and Appendix III shall be complied with;
- (iii) The modular units of the above MiC system shall be fabricated in the factories listed in Appendix IV with a valid ISO 9001 or equivalent quality assurance certification; and
- (iv) This in-principle acceptance (IPA) is subject to a validity period expiring on 20 June 2027.

General information of the MiC System (Model No. CCSIC-MIC-HK-S6-1) submitted by China Construction Science and Industry Corporation Ltd. is available on BD's website.

- 目前公司已取得6层IPA许可, 30层IPA许可也即将落地。
- 中建科工已为香港市场, 做好了准备。
- At present, the company has obtained the 6-layer IPA license, and the 30-layer IPA license is about to land.
- CCSIC is ready for the Hong Kong market.

/This ...

九龍油廠地海座道 11 號西九龍政府合層北座風字層總語 Buildings Department Headquarters, North Tower, West Kowloon Government Offices, 11 Hoi Ting Road, Yau Ma Tei, Kowloon





