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# Zhu Jingxiang

New Bud Building System  
Sichuan / Jiangsu, China 2010-2014

朱竞翔  
新芽建筑系统  
中国, 四川省 / 江苏省 2010-2014

Since 2008 Professor ZHU Jingxiang from the Chinese University of Hong Kong (CUHK) and his team have invented several lightweight building systems with impressive architectural qualities and outstanding structural performance. New Bud Building System (NBS) is one of those and has a composite structure consisted of a light gauge steel frame strengthened by rigid wooden panels. Such a composition results in features such as light-weight and outstanding resistance to seismic forces. The multi-layered, continual envelope provides a comprehensive thermal solution, resulting in good indoor comfort. Erection takes two to four weeks with the dry method. A building constructed with this system can also be demounted, relocated or renovated easily, with very low impact to the surroundings. It is suitable for buildings of four stories or less. The surface can be customized.

After the China Sichuan 512 earthquake, the design team from CUHK applied NBS in provinces of China that are especially prone to earthquakes. The challenges posed by construction in remote locations lacking in resources pushed designers to develop flexible strategies and efficient tools, linking the rural and industrial reality of mainland China with academic research. From such confrontations has emerged a range of contemporary and localized solutions that address the general challenges of sustainable development.

All prefabricated components in the projects except Grameen Bank of the Yunus Centre were ordered from factories in Chengdu and Chongzhou, to minimize energy use in transportation and utilize local resources. This strategy guaranteed building quality under stringent budget conditions. In series projects, the team was not only responsible for the design, but also contributed to many other tasks, from budget planning to post-occupancy evaluation. Through these projects, the system has proven its wide applicability, while the team has outlined a unique approach for sustainable development, for both the user and local building industry. The built works consequently reinstate the architect's original role as both master of construction and guardian of society.

"Bud" at the beginning was used to name the first school reconstruction project during 2009-2010, donated by an alumnus from New Asia College of the Chinese University of Hong Kong. Since the pronunciation of "Bud" in Chinese is the same as "Asia", the donor and the architect named it. It also refers to the English word "bud", implying that small segments are assembled into one architecture as plants develop from buds.

"新芽"原是用来命名2009-2010年间的两个学校重建项目的,这两个项目由香港中文大学新亚学院的校友捐赠。由于"芽"与"亚"的中文发音相似,所以捐助者和建筑师用"新芽"来命名它。同时也取英文"bud"(芽)的意思来寓意这个组合系统,就像嫩芽成长为植株一样,小片段可组成一个建筑。

## Credits and Data

Project title: New Bud Study Hall in Dazu Primary School  
Project type: School  
Location: Yanyuan, Sichuan, China  
Completed: 2010  
Principal architect: Nelson Tam Sin Lung, Zhu Jingxiang  
Design team: Xia Heng, Zhang Dongguang, Gu Tian  
Structure: Huang Shiping, Zhu Jingxiang  
Size: 260 m<sup>2</sup>

Project title: Work Station in Anzihe Panda Nature Reserve  
Project type: Office + Exhibition  
Location: Chongzhou, Sichuan, China  
Completed: 2011  
Principal architect: Zhu Jingxiang, Xia Heng  
Design team: Zhang Dongguang, Wu Chenghui  
Structure: Zhu Jingxiang, Wu Jing  
Size: 200 m<sup>2</sup>

Project title: Work Station in Baishuihe Panda Nature Reserve, Sichuan  
Project type: Office + Exhibition  
Location: Xiaoyudong, Baishuihe, Sichuan, China  
Completed: 2013  
Principal architect: Zhu Jingxiang, Zhang Dongguang  
Design team: Xia Heng, Han Guori  
Structure: Wu Jing, Zhu Jingxiang, Li Jing  
Size: 140 m<sup>2</sup>

Project title: Grameen Bank of the Yunus Centre  
Location: Xuzhou, Jiangsu, China  
Project type: Bank + Community Centre  
Completed: 2014  
Principal architect: Zhu Jingxiang, Han Guori, Xia Heng  
Design team: Zhang Dongguang, Huang Zhengli, Wu Chenghui, Zhao Yan  
Structure: Li Jing, Huang Shiping, Wu Jing  
Size: 240 m<sup>2</sup>

*Work Station in Baishuihe Panda Nature Reserve, Sichuan, completed in 2013, was commissioned by World Wildlife Fund (WWF). It was the fifth application of NBS. The station is situated on a hill slope in the entrance area of a nature reserve. The project intended to demonstrate making use of the landscape instead of flat rice fields in reconstruction. A monorail transportation system was first set up to transport materials when construction started. It was used to deliver supplies and visitors after occupation. The two-story building is elevated, sitting on tubular piles. The pitched roof creates a tall and straight look and makes the second floor spacious and bright. Photos by Zhang Dongguang, courtesy of the architects.*

四川白水河自然保护区工作站, 完成于2013年, 是受世界自然基金会(WWF)委托的一个项目, 为新芽建筑系统的第五次应用。该保护站坐落在自然保护区入口区域的一个山坡上。项目旨在高效利用山坡地进行重建, 而不是占用平坦的稻田地。山地缆车系统在建设之初便被用来构建短距离运输, 房屋建设完成后又被用来运送物资和游客。两层楼高的建筑坐在管桩上被托举起, 并以斜屋顶创建一个挺拔的外观和宽敞明亮的二楼空间。





**New Bud Study Hall in Dazu Primary School**, completed in 2010, is a compact single story building as the second application of NBS, housing three classrooms and a reading lounge, without wasting the precious 260 m<sup>2</sup> space on corridors. Each room has distinct proportions and orientation in order to give kids from ethnic minorities a clear sense of location when inside. A simple timber-trellis cladding design allows the Study Hall to fit into the vernacular of the village while reducing the consumption of the logs required in building such a space with traditional methods. Photos by XIA Heng, courtesy of the architect.

新芽达祖小学是一个紧凑的单层建筑，建于2010年，是新芽建筑系统的第二次应用。占地仅260m<sup>2</sup>，设有3间教室和1个阅读空间，采用了紧凑的扇形平面布局，没有在廊道上浪费宝贵的可用面积。室内4个空间的尺寸、比例与朝向各不相同，使少数民族的儿童在室内可以自然地感知所处的课室。简单的外围木制格架设计，让这个现代的小学融入乡村氛围，又毋须像当地传统的井干式建筑般消耗许多原木。



**Work Station in Anzhihe Panda Nature Reserve** was completed in 2011 at the end of a road, standing in a forest with tall fir trees. The 11 m tall building is conceived as a cage structure and has three stories lifted up by pad foundations. Infill panels and diagonal tension rods provide additional support against buckling for slender columns. Room height, window level and stair position vary from floor to floor, differentiating the experience and hinting at the appropriate function. In order to ensure a smooth diagonal loading path, bay windows with polyhedral form offering rigidity were distributed on facades in a homogeneous chessboard pattern. Photos by Xia Heng, courtesy of the architect.

崇州鞍子河大熊猫自然保护区工作站，建于2011年，它坐落在进山公路的尽头，在高大的杉树林中若隐若现。建筑整体架空于点式基础之上，形成整体的笼状结构。这栋11m高的建筑共有3层。填充板材与斜向拉杆使细长的结构立柱免于屈曲。每层房间的高度、窗位和楼梯的位置各不相同，形成差异化的体验，并暗示相应的功能。多面体的窗洞使用均匀的棋盘图案分布在立面上，在强化自身结构的同时，也确保了结构的对角传力路径。

自2008年以来，香港中文大学朱竞翔教授和他的团队开发了一系列轻量建筑系统，这些系统具有卓越性能，其质量令人赞叹。“新芽”建筑系统便是其中之一，它是由轻钢龙骨与多层木基板材加强组成的复合结构。通过这类系统建造的房屋不仅重量轻，而且具备良好的抗震能力。多层次的表面构造连续包裹建筑，可提供全面的隔热保护，提高室内的舒适

度。在现场搭建仅需2-4周的干法施工，对周边环境的影响非常小。这类系统适合4层或以下的地表建筑，由这种系统所建造的建筑可实现易拆卸、易搬迁的可能，也易于实现外墙的个性化定制。

四川省“5·12”汶川大地震发生之后，来自香港中文大学的设计团队将“新芽”系统多次应用于内地地震多发地区。应对偏远地区资源匮乏

的挑战，设计师们研发出了灵活的设计策略和有效的工具，通过学术研究将内地乡村与工业现实连接起来，展现出一系列兼顾现代性与本地特征，并回应可持续发展问题的解决方案。

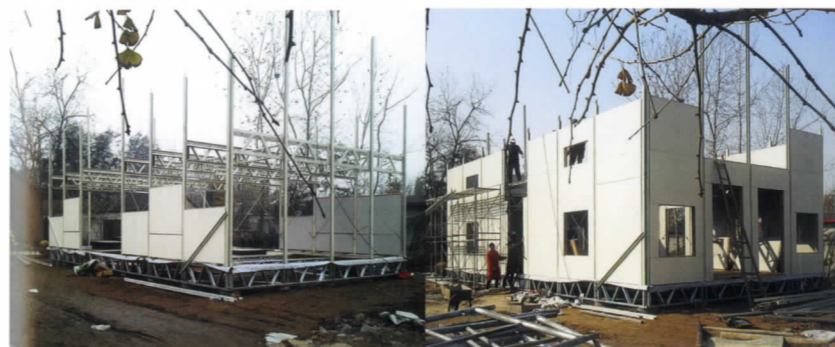
本篇中的项目的所有预制组件都在邻近的成都和崇州工厂进行生产，以减少运输花费并结合利用当地资源。这种策略保证了建筑在严苛的预算条件下的优良品质。

在上述一系列项目中，团队不仅负责设计与建造，也承担了从早期预算规划到后期性能检测之间的许多其他任务。通过这些项目，该系统已证明了其广泛的应用领域，而团队则创造出了一种对用户和当地建筑行业而言，非常独特的可持续发展方式。这些建筑恢复了建筑师在社会中的原始角色职能——建设并守护社会。



**Grameen Bank of the Yunus Centre at Lukou of Xuzhou** was a project CUHK team was invited to design. From design to production and construction, the project took only eight weeks. Component assembling for the main body and in-situ construction took four weeks. The team adopts close-range distributed production to economize logistics. Most builders were local villagers, and bricks originally in there were reused. Photos by Han Guori and Xia Heng, courtesy of the architect.

徐州陆口尤努斯中心格莱珉银行，是香港中文大学团队于2014年11月应邀设计的一个项目。项目从开始设计到生产建设完成，仅用了8周时间。主体的组装和现场搭建用时4周。团队利用在邻近工厂进行分布式生产的方式，节约了物流。在这个项目中，大多数的工匠是当地的村民，原有房屋的砖头也得到了回收使用。



Construction of Grameen Bank of the Yunus Centre  
尤努斯中心格莱珉银行的施工现场



Mock-up of decorative high-pressure laminated panels  
高压装饰层积板大样

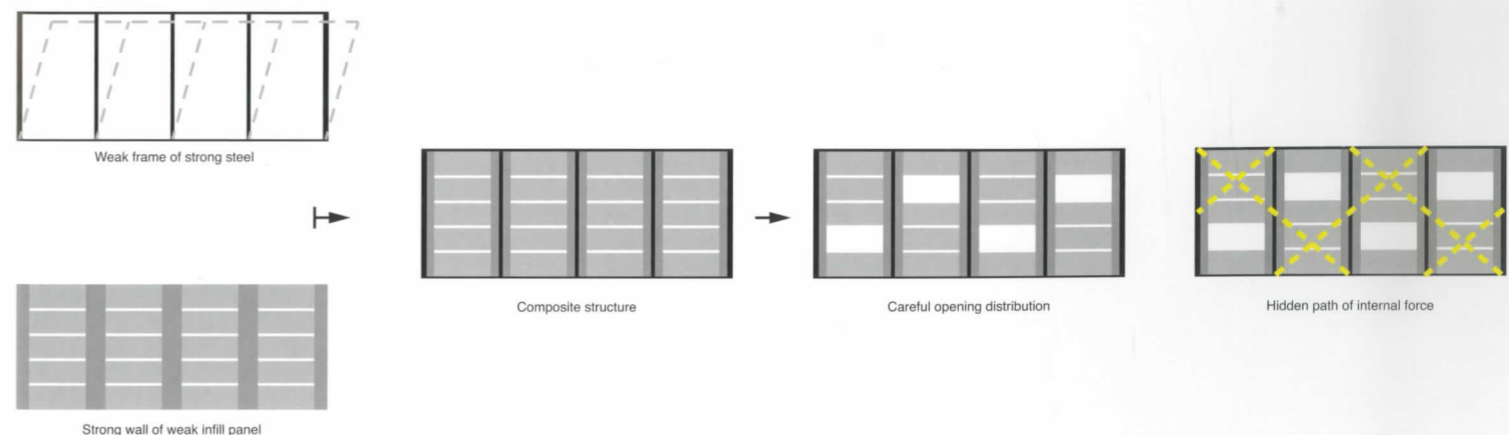


Diagram of NBS composition / 新芽建筑系统的构成图