The Discussion on Construction Engineering Technology on Ultra High-rise Building

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ABSTRACT With the speeding up of urbanization and increasing of urban population, the urban land resources are increasingly scarce. Emergence of ultra high-rise building is an inevitable trend. At present, our construction industry is in the rapid development period, where the proportion of ultra high-rise buildings in urban architecture of many big cities constantly increases. The improving ultra high-rise engineering technology is an important part of the construction industry in our country. This paper will analyze the ultra high-rise construction technology of building work in detail.

KEYWORDS Ultra high-rise buildings Characteristic Construction technology

1. Introduction
With the continuous development of China’s social economy and urbanization, the continuous improvement of urbanization is an important aspect of our Chinese dream, improving the modern architectural technology, strengthening the process of urbanization, building ultra high-rise skyscrapers is the effective ways to save land resource, and alleviate the increasing urban population in our country. In this paper, a comprehensive analysis is made on the present situation of ultra high-rise buildings and construction technology.

2. Characteristic of ultra high-rise buildings
At present, there is no unified standard on the definition of high-rise building, of which the more authoritative definition is specified on the United Nations conference of international high-rise building on the high-rise building construction in 1972. It has a limit to the height of building, generally is above 100 meters or more than 40 layers. The record of the world’s tallest building is constantly refreshed, once the Pentagon was the tallest building in the world, later was Malaysia’s Petronas Towers in Kuala Lumpur. Now the world’s first building is the United Arab Emirates Dubai Tower, which is 828.14 m high, into the sky, its amazing modern architectural technology.

The differences between ordinary architecture construction application technology and high-rise buildings mainly include the following aspects: first, the investment amount was huge, increasing pressure, and construction period was long; second, working at height has higher risk, and the security of operation should enhance; third, the foundation embedment is deeper, there are higher requirements for concrete foundation slab and crack control; fourth, narrow work space increases organization difficulty of time and space of construction work; fifth, ultra high-rise buildings have a higher requirement for foundation soundness and construction materials; sixth, a series of construction building with great height and distinctive modeling increase the difficulty of construction.

3. The optimization focus of ultra high-rise buildings construction technology
Since there are a series of features for ultra high-rise buildings, such as high requirement of engineering technology, great volume of the work, high difficulty, and large capital investment. We should continually optimize the construction technology, mainly including the following aspects: first, with the main building construction as the key, promote the construction of main building in the process of construction. Perform the main building construction in advance as far as possible, to minimize the payback period of funds, speed up the construction speed through scientific planning, and rational layout on the premise of...
The steel structure in the process of construction,防止钢温度操作和涂抹防护涂层形成保护层。因此，非常必要。钢结构在高温下强度下降，如果温度超过300度，建筑钢的强度将低于正常温度，也不能保持高温下的稳定性，为了促进稳定性，钢结构在高温下的应用至关重要。一般而言，钢结构在超高层建筑中广泛应用。对于具体强度的超高层建筑，主要采用钢和混凝土结构。在实际施工中，钢结构的主要支柱，浇筑混凝土，应用吊车将浇筑结构移动到所需位置，通过良好的联合作业，实现空间的合理化，大大提高施工效率，确保安全施工，降低高空作业的安全风险。在施工过程中，采取一系列优化措施，进行原位操作，管道铺设和高空作业。为了确保建筑的完整性，集成滑模模式方法可以保证建筑的完整性，减少临时支撑和模板应用，主要采用集成滑模，横向施工等。目前，中国拥有几种超高层技术：超高层建筑要求更高的技术和安全性。与普通建筑技术相比，超高层建筑具有更大的难度，更长的施工周期和更高的技术要求。随着技术的发展，对绿色建筑的呼吁越来越高。在超高层建筑的施工中，集成滑模方法和爬模方法可以改善施工效率，减少占地面积和时间，同时提高企业综合效益。5.6.3 横向施工方法
横向施工方法是一系列相对复杂的施工原则。一般而言，施工过程中需要考虑空间的合理化，同时也要保证施工效率，安全操作，集成滑模方法可以确保建筑的完整性，减少临时支撑和模板应用，主要采用集成滑模方法和爬模方法。目前，该技术已在高层建筑中广泛应用，它可能提高施工的效率，确保安全操作，提高企业综合效益。4.3.3 横向施工方法
横向施工方法具有一定的复杂性。在超高层建筑的施工中，集成滑模方法和爬模方法可以改善施工效率，减少占地面积和时间，同时提高企业综合效益。
loaded by construction before completing the architecture construction bottom plate. In this case, conduct the down excavation of steps, and perform the bottom cover of underground structure of every layer, at the same time, enforce the construction of structure on the ground step by step [1].

Compared with the traditional construction technology, athwart construction method has the following advantages: first, athwart construction method can greatly save the time limit of basement, no difference between engineering, except for occupying absolute time limit for the next layer. Besides that, it can ensure the contemporary construction of the basement under the first floor and structure above the ground; second, compared with the ordinary temporary support, it can guarantee a solid foundation, reduce the pressure of adjacent pipeline. This method conducts pouring layer by layer on the basement structure, as the supporting structure, the middle support column has stronger stiffness for internal support. By means of step by step casting, make integral load and the main pillar avoid deformation and distortion of the foundation, and decrease significantly the settlement influence of adjacent underground pipelines, roads and structures; third, athwart construction method can satisfy the arrangement of poured underground continuous wall during construction, to reduce the pressure of floor and floor reinforcement issues, and let floor design to be more reasonable. Apply reliable or planed red line to construct underground continuous wall, let it become a permanent exterior wall of basement, thereby expanding the construction area of engineering; fourth, under the premise of meeting structure pipeline layout, poured underground continuous wall can be built close to or on planed red line and used as a permanent basement exterior wall, then achieve the goal of extension of building area.

4.4. Pumping concrete technology is the concrete refining technology adopted by ultra high-rise buildings

Since ultra high-rise buildings have larger weight, bigger pressure, longer time limit, in the process of building engineering construction, hence demand for concrete was large. Traditional concrete technology which needs to configure a large number of machines and cement is difficult to meet the requirements. At present, the pouring concrete technology usually used in mainland of China is to configure the fly ash and chemicals in certain proportion. With the development of modern construction technology, emergence of pumping concrete technology provides greatly convenience for the transport of concrete, improve work efficiency, save a lot of manpower, is quick and efficient, it is the foundation to construct the ultra high-rise buildings smoothly [2]. With the progress and development of pumping concrete technology and the direct pumping of concrete by machine to the required location, the efficiency of building is greatly improved.

5. Specific measures for issues of ultra high-rise buildings engineering construction

5.1. The problems of reinforced concrete precast pile and the corresponding measures

5.1.1. Breaking of pile body

Strict inspection on bending condition of pile before construction; guarantee the quality of concrete; effective control of slenderness ratio of each pile; timely repairment should be made once the pile body fractures!

5.1.2. Tilt of pile body

Strictly control verticality of pre-bored hole; ensure construction site must be smooth; in process of pile extension, and ensure that axis coincidence of pile up and down.

5.1.3. Breaking of pile body

The choice of pile hammer must be reasonable, ensure heavy hammer taps; design of pile should be carried out in accordance with relevant quality standards; and strength of precast pile should meet the design strength requirements.

5.2. The problems in steel structure installation process and the corresponding measures

5.2.1. Displacement of bolt

Effectively guarantee bolted frame strength and stiffness, check bolted frame dimension, after completing bolt installation and reexamination should be made to prevent problems.

5.2.2. The displacement of steel column

Before pouring the foundation concrete, re-examination the pillar axis measurement in detail, fix the embedded bolt with fixed chuck or fixed frame, and avoid dislocation.

5.2.3 The vertical deviation of steel column is greater than the specified deviation

When lifting the steel column, we should effectively fix the whole row of column, arrange column bracing, and then hoist the upper structure. Temporary support should be added immediately to prevent impact due to wind or collision.

5.2.4. Mounting surfaces is not in conformity with the provisions

Timely clean up the dirt on the mounting surfaces of bolt and remove the burr by grit blast or polish.

5.2.5. Connection plate is not closely connected

The ratio of planar slope of component and connection steel is more than 1:20, when needing straight connection during the process of steel plate connection, gaskets should be placed in the gap to guarantee close contact.

5.3. The problems of reinforced concrete construction project and the corresponding measures

5.3.1. A honeycomb pitting surface

The process of casting may be conducted in a hierarchical
manner. Thus, choose correct proportion of concrete and mortar sand to increase stiffness of the template [3].

5.3.2. Lack of edges
When the edges of concrete member are damaged, repair it in time. When disassembling module, protect the edges are not destroyed; surface of wood template plane will be polished and smooth.

5.3.3. Hole
When making the pouring of concrete, select fine stone concrete; clean up the loose concrete around the holes which are formed, complete the surface protection work; inspection holes should be leaved when pouring the high strength plate and pillar.

6. Conclusion
Finally, with the development of economy, contradiction between urban land resources and population was more highlight. The rise of ultra high-rise buildings is the inevitable trend of social and economic development, and mature ultra high-rise buildings construction technology is the key. Now the ultra high-rise buildings level in our country has reached the world high level stage, but the development is imbalanced. The top cities have mature technology, while the technical level of lower-tier cities still needs to continue to strengthen. Therefore, we need to constantly accumulate experience in practice, absorb advanced construction technology at home and abroad, develop and perfect constantly, promote the ascension of high-rise buildings level and the rapid advance of urbanization.

Conflicts of interest
These authors have no conflicts of interest to declare.

Authors’ contributions
These authors contributed equally to this work.

References