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Contents

Original Articles

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Analysis on Promoting Urban Government Management Innovation of "Digital City"

Junfeng Li*

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Abstract: In the construction of digital government, we have adopted such practical measures as issuing a rolling and progressive digital government plan, issuing relevant policies and regulations, establishing a perfect digital security protection system, promoting digital opening-up and internal management, paying attention to citizen participation and building a digital platform for citizen participation in politics.

Keywords: Digital Government; Government Digital Transformation; Digital City; Digitalization

Introduction

Improving the digitization, legalization and systematization of social governance emphasizes "pluralistic co-governance" and "democratic consultation" and its goal is "co-construction, co-governance and sharing". The premise is to adhere to the Party's leadership. It reflects the governance with command and objectives, mobilizes the active participation of multiple subjects in the whole society, and is holistic, collaborative and systematic governance. Under this governance model, national governance needs to work hard on how to mobilize other governance subjects to participate in governance and improve governance capacity.

1. Digital urban government management is the inevitable trend of development

The operation management department of the government brings convenience to the citizens when operating the digital city. The citizens can complete various matters on the mobile terminal without leaving home. Through the establishment of digital medical treatment, citizens' electronic archives can be formed to bring convenience to citizens for medical treatment. Urban infrastructure construction includes gas, pipeline, transportation, power grid, water network and other infrastructure. The application of digital city operation mode can promote flexible manufacturing and agile manufacturing, and promote the transformation and upgrading of manufacturing industry. In the field of trade, applying the Internet to build an e-commerce platform can vigorously develop e-commerce industry and logistics industry and reduce logistics operation costs. The development of modern digital technology promotes social transformation and makes people's life better [1].

1.1 Changing urban development direction

Digital city is a new concept of urban development. The use of digital technology, cloud computing, Internet of things, broadband digital technology and digitization can change the past urban development model from high-speed urban growth to quality growth.

1.2 Accelerating urban transformation and development

In the direction of digital city development, we can use high-tech technology to improve the level of urban operation and maintenance management, promote the innovative development of urban management and promote the efficient operation of the city. Domestic government departments should establish digital cities as one of the important development engines of

cities. Digital cities can handle the stock, change the operation mode of traditional industries in the past, and help to promote the improvement of product benefits. Domestic government departments should establish digital cities as one of the important development engines of cities. Digital cities can handle the stock, change the operation mode of traditional industries in the past, and help to promote the improvement of product benefits. Development increment is the main content of urban construction and development at present. It can use digital technology industry to promote new social and economic growth points [2].

2. Countermeasures of promoting urban government management innovation of "digital city"

2.1 Promoting digital technology vigorously

We should vigorously expand the domestic intelligent service industry, optimize and improve the supporting infrastructure of digital city construction, gradually promote the intelligent development of different service fields in the city, and apply the digital platform to benefit a number of industrial services in the city. At the same time, we will vigorously promote the construction of e-commerce platforms and the application of various digital technologies, gradually establish and improve the service system, establish a national credit management system and a logistics network platform, strengthen the popularization of digital life, and build a digital operation service system in key areas of people's livelihood, such as national medical insurance, education and health care so as to bring more convenient life services to citizens. We should vigorously promote the construction of e-government service system and gradually promote urban development planning and intelligent development. We will bring urban management into the intelligent management of public security, build a public security monitoring system, realize the intelligent processing of various government affairs, vigorously promote the digital construction of the government's internal network, and promote the development and construction of e-government system [3].

2.2 Maintaining safety

We should establish and improve the digital security technology system, including network security platform monitoring, application of cryptographic algorithms, use of security chips and application of reliable secure digital management terminals. At the same time, it is also necessary to formulate a security risk response management mechanism in combination with the current new business and new technology. We also need to build a security early warning system, a digital protection system and a network trust system. In order to improve the security of digitization within the digital city, we should also enhance the emergency handling ability, information acquisition ability and monitoring ability of administrative departments, establish remote disaster recovery management center and build a perfect disaster recovery system. In some important administrative units, we should set up multi-level security and confidentiality mechanisms, build data centers, and strengthen the implementation of digital authentication and other related work. We should establish a digital management platform, set up data encryption and establish a firewall on the system platform to prevent criminals from invading the system. In the construction of digital platform, different personnel should be given management authority. For urban operators, the access authority of digital urban database should be divided according to the management scope of their department [4].

3. Constructing a people-centered digital governance concept

We should change the traditional concept of government governance and strengthen the sense of purpose of serving the people. When providing public services, the government should implement the people-centered governance thought. Government service personnel should follow the trend of the "digital" era, change the traditional concept of government affairs, always keep in mind the purpose of "serving the people", actively publicize, promote the "digital government" to the people in action to improve their ability and quality of serving the people, and continuously improve and optimize public services. For example, the "run once at most" reform in Zhejiang Province provides a lot of reference experience for China's

local governments. Since 2017, Zhejiang Province has carried out the “run once at most” reform, and its “digital government” construction is ahead of all parts of the country. “Run once at most” specifically means one window acceptance and integrated service. If the people come to the government department for work, they only need to simply hand over the materials to the comprehensive window, and the administrative comprehensive service center will be responsible for the overall planning and transfer according to the responsibilities according to the situation of the people [5].

4. Digitization of governance units

Compared with simple and planar rural areas, modern cities are a physical space with a high concentration of population, resources and various elements. Various relationships and structures are intertwined. The governance objects are different and coincide in the dimensions of space, time and management. “Space may play a decisive role in the process of establishing a certain totality, a certain logic and a certain system.” In the spatial dimension, people, things and objectives in cities are divided according to geographical boundaries, and the corresponding governance units can also be directly observed and measured. For example, taking the urban community or management grid as the basic governance unit, the whole urban space will be divided into large and small communities or grids. Each governance unit has similar governance attributes and functions, which can be accurately identified, digitized the basic data of length, width and height, and then accurately measured and complex calculated. In the time dimension, the urban governance unit is homogeneous and uniform. It is a hierarchical parallel unit formed according to the flow of natural time, which comprehensively shows the rules of the beginning, continuation and switching of urban governance activities. According to Parsons, physical time is the relationship between different events in parallel space, which is dynamic and relatively static. According to the logic of physical time, the size of each governance unit is completely consistent, the governance object and capacity are relatively fixed in a short time, and the governance power and its resources are differentially configured according to the operation of time. According to the organizational logic of bureaucracy, the governance unit is determined by the division of labor of administrative organs and their functional departments, and the governance power, resources and corresponding governance responsibilities are distributed through “articles” and “blocks”. Starting from the “article”, the governance unit is the coverage of the responsibility scope of the “article” department. Its governance boundary is defined by taking the matter as the center, and different governance units often overlap highly. Starting from the “block”, the governance unit is delineated with the administrative division as the boundary, and is formed according to the administrative level from top to bottom. For example, in the urban four-level system management of “city-district-street-community”, the upper level governance unit is a simple addition of the lower level governance units. Digital driven urban governance is data-centered. Massive data carries the governance will and power, changes the logic of governance power and resource allocation in the past, promotes the integration of multi-dimensional governance units, improves the clarity of the boundary of governance units, and makes it easier to calculate the governance units and their governance capacity. Digital driven urban governance mainly determines the governance unit through the data and operation of governance objects and urban components, so as to delimit the boundary of governance unit more accurately.

Conclusion

The in-depth application of digitization in the field of urban governance promotes the digitization of governance units, the clarity of governance subjects, the flattening of governance levels and the quantification of interaction intensity, and improves the agility of urban governance, so as to quickly and efficiently respond to various urban governance needs or problems, and effectively respond to the contradiction between the complexity of urban governance needs and the fragmentation of governance. Digital driven urban governance reform is a quiet revolution. Administrative organizations still maintain the original division of labor, specialization and operation mechanism. The application of digital technology in urban governance has promoted the formation of an integrated and centralized urban governance mechanism through data and its corresponding modern digital technologies, which is effectively solving the problem of fragmentation of urban governance. It should be noted that the surging digitization and the application of digital technology are matter centered. Only the governance objects or problems that can be digitized can be incorporated into the digital platform for further

processing and calculation.

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Comparative Study on Modular Building and Traditional Prefabricated Building

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Abstract: The structural system of traditional prefabricated building mainly corresponds to direct prefabricated structure system and prefabricated large plate structure system. Modular building system takes each room as a modular unit, and the whole unit is prefabricated in the factory, transported to the site after completion, placed in a suitable position, and assembled into a whole building through reliable connection. The building components of both are prefabricated by the factory and assembled directly on site. Modular architecture can be said to be the inevitable result of the development of traditional prefabricated buildings, the product of the development of the times, and has a good development prospect.

Keywords: Traditional Prefabricated Buildings; Modular Building; Building Industrialization; Prefabricated Assembly Rate

1. Introduction of prefabricated buildings

Prefabricated building refers to a building in which every part of the building is directly assembled on site according to the mode of installation on site, just as factories produce machines in batches and sets.

According to different prefabrication degrees, prefabricated units of prefabricated buildings can generally be divided into bar units, plate units and modular units, and the corresponding building structure systems are: direct prefabricated structure system, prefabricated large plate structure system and modular building structure system [1].

The advantages of prefabricated buildings are also obvious. On the one hand, the production method of prefabricated components in factories can better control the production conditions of components to ensure the quality of the project, and the operation method of on-site assembly strictly follows the process, improving the quality and production efficiency of the project and reducing the potential safety hazards; On the other hand, in the operation process of assembly-type construction engineering, the air pollution caused by dust can be relatively reduced, and the building materials can be recycled, thus improving the use efficiency of materials and being more energy-saving and environment-friendly.

Fig. 1 container building example

2. Comparison between modular building and traditional prefabricated building

Compared with traditional prefabricated buildings, modular buildings are similar in that the building components are prefabricated by factories and have the characteristics of standardization. Next, this paper will compare the similarities and differences between the following three aspects:

2.1 Component fabrication

In the design of prefabricated components in prefabricated buildings, the principles of modularization and standardization should be followed, and the standardization degree of components should be improved as much as possible, and the types of components should be reduced as much as possible, so as to achieve the purpose of reducing the project cost. For the design of the size and weight of parts and components, the ability to transport to the site after production should be fully considered; In the design of prefabricated components, the service performance of components, such as fire resistance, durability, airtightness, insulation, thermal insulation and other factors, should be fully considered. For the design of the main load-bearing components, the strength required by the code should be achieved to ensure the seismic resistance and stability of the whole building. [2]

The structural system of traditional prefabricated buildings mainly corresponds to the direct prefabricated structural system and prefabricated large slab structural system. The components that need to be produced in advance in these two structural systems mainly include: composite beams, composite floors, prefabricated columns, prefabricated stairs, prefabricated composite shear wall plates, prefabricated external wall hanging plates, etc. The production processes of prefabricated components include: steel bar processing, binding, welding, assembling dies, mixing and pouring concrete, dense forming, maintenance, etc.

Modular building system takes each room as a modular unit, and the whole unit is prefabricated in the factory. After completion, it is transported to the site, placed in a suitable position and assembled into a whole building by reliable connection. According to the structure and function of building modules, the modules used in modular buildings can be divided into: wall load-bearing module, local opening module, corner pillar support module, stair module and non-load-bearing module; According to the structural forms of modular buildings, the structural systems adopted by them can be generally divided into full modular building structural systems and composite modular building structural systems [3]. The structure of a single modular component unit is simple, and modeling is convenient. At the same time, the reasonable structural system composed of component units is systematic, and becomes a part of the whole building after hoisting. The design difficulty of modular building component units lies in how to meet the design requirements, and at the same time, the structural system composed of modular units is required to meet the overall and connection design requirements.

2.2 Construction arrangement

One of the characteristics of the construction of traditional prefabricated building structure system is to face the problems of transportation, lifting and stacking of components. In the transportation process of components, in order to prevent the components from moving, toppling and deforming, it is necessary to take corresponding fixing measures, and in order to prevent the components from being damaged, it is necessary to take measures such as setting protective pads. When transporting wallboard, special brackets shall be used, and the components and brackets shall be bound firmly. The transport vehicles of prefabricated components shall meet the requirements of component size and load. The wallboard should be placed symmetrically with the exterior facing up, and the upper part of the component should be isolated by wooden cushion block and fixed measures should be taken to support the cushion firmly. When the components are transported in a stacked and flat manner, measures should be taken to prevent cracks in the components.

Figure 2 Assembly of prefabricated buildings

Modular building structure system, according to the concept of modularization, after prefabricated components are completed, they are assembled into large components at the assembly site, and then assembled with modules and transported to the hoisting points in the construction area, and then hoisted in place by large crawler cranes. Because modular construction will form relatively large components and items, on-site hoisting requires larger hoisting machinery and equipment than the traditional prefabricated building structure system. During the whole construction process, the parallel operation of civil construction and equipment installation appears, which can shorten the construction period, but there is still the boundary of the overall stage.

Figure 3 Assembly of modular buildings

2.3 Degree of informatization

The construction drawings of traditional prefabricated buildings are generally delivered in two-dimensional form, and the information in the design stage is also transmitted in the form of two-dimensional construction drawings, which not only consumes a lot of energy for designers, but also requires the builders to grasp the drawings very accurately. In fact, both traditional prefabricated buildings and modular buildings need strict management requirements for the production, transportation, lifting and stacking of prefabricated components, and traditional information management methods are difficult to meet the requirements, so advanced and efficient management methods should be adopted in information management. With the development of modular buildings, the structural system is becoming more and more complex, and the requirements for construction accuracy are becoming more and more stringent. It is difficult to express the complex space and components in detail by traditional CAD lofting of structures. Especially for the construction process of modular building which is different from traditional building, the 3D information model can be established by combining BIM technology in the design stage, which can make the analysis and review process very easy and convenient.

3. Problems in the practical application of prefabricated buildings in China

In recent years, through the continuous efforts of the government and enterprises, prefabricated buildings have made rapid development in China, but there are still many problems in the development stage.

3.1 High project cost

The cost of traditional construction engineering includes direct cost, indirect cost, profit and tax, while the cost of assembly construction engineering includes not only the cost of traditional construction engineering, but also the production cost of prefabricated components, the transportation, lifting and stacking cost of components, and the installation cost of component installation site. From the perspective of building scale, the larger the scale, the more kinds of components, the more complex the process, the more manpower and resources are needed, and the higher the cost.

The prefabricated assembly rate of traditional prefabricated buildings refers to the proportion of prefabricated components in building structures such as walls, beams and columns, floors, stairs, balconies, etc. Generally, it is an important factor affecting the cost of prefabricated buildings. In a certain range, with the increase of assembly rate, the cost decreases [4]. Modular buildings are difficult to assemble, and have high requirements for hoisting and installation, so they have different requirements for hoisting machinery. Different types of hoisting machinery have different costs, so hoisting machinery should be selected according to the size of components. At present, the cost of prefabricated buildings in China has been in a relatively high state, which is also related to the incomplete industrial chain in China. The technology of component design, production and construction is relatively backward, and there is a lack of supporting facilities and modern enterprise management mode.

3.2 Lack of technical support

The development of prefabricated buildings needs the support of professional technology. However, the technicians engaged in assembly at present in our country are lack of professional quality and professional construction team and technical management personnel, which leads to the fact that most of the prefabricated buildings in our country can only achieve the industrial production and assembly construction of some components at present, and the standardized design, integrated decoration, information management and intelligent application can all do very little at present. Standardized design is also the basis of integrated design in assembly-type construction, but the main problem is that there is no unified design template as a standard, which leads to uneven quality of prefabricated components. Different places have different standards for prefabricated production, hoisting transportation and assembling operation of components, which is a major obstacle to the rapid development of prefabricated buildings in China.

Both traditional prefabricated buildings and modular buildings need professional factories to produce prefabricated components, professional technicians to assemble and other operations, professional transportation teams to transport and protect components, and professional hoisting machinery to carry out hoisting work, thus reducing manual intervention and assembly time. In addition, one of the difficulties in construction is the assembly of components, so as to ensure the quality of connection points, so as to ensure the quality of fabricated buildings. In the current situation in China, the bearing capacity and stiffness of joints are well guaranteed, but the ductility cannot meet the requirements.

In a word, every process from design to transportation to site installation, such as measurement, hoisting and connection of components, needs to have high technical level and management level, and technical breakthrough is needed to make prefabricated buildings popular in China.

4. Development strategy and improvement measures

Compared with the developed prefabricated building industry in foreign countries, there is still a big gap between China and it, so we should take corresponding measures to promote the development of prefabricated buildings in China.

4.1 Adopt advanced engineering mode

In recent years, prefabricated buildings have been implemented in many places in China. However, because the management mode still adopts "subcontracting at different levels", the links between various departments are insufficient, resulting in many problems in actual production. In my opinion, EPC mode has more advantages than traditional engineering mode, and it is an effective way to implement EPC mode.

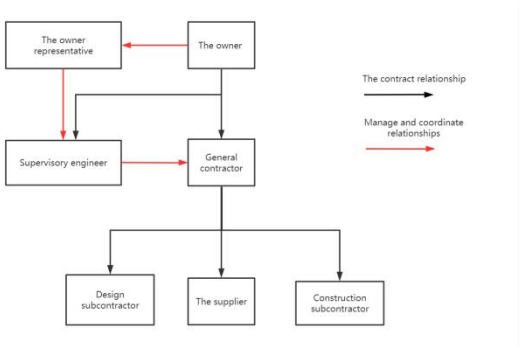

Fig. 4 diagram of EPC mode

EPC mode is the perfect combination of architectural engineering mode and design, the construction unit indicates the investment intention, and the general contractor is responsible for the component design and production, assembly construction, etc. The project mode includes organization management, cost control, schedule control, quality control, contract management, information management and communication management, which realizes the high organization of project management and gives full play to the advantages of prefabricated buildings. Secondly, the engineering model can coordinate the manufacturing of factory components and the installation of field components, effectively shorten the construction period, optimize and integrate the resources of the whole industrial chain, reduce the conflicts among various links, and improve the production efficiency and coordination among various departments. Furthermore, the project mode can be managed globally, the materials to be purchased are determined in the design stage, and the information of all parties is coordinated in the whole process, which greatly reduces the consumption and waste of resources, thus reducing the total cost of the project.

4.2 Increase the development of science and technology

Prefabricated buildings can't develop by going up one flight of stairs without the development of science and technology. With the continuous development of prefabricated buildings in China, there will be a steady stream of social needs, so we should strengthen the research of prefabricated buildings and speed up the construction of construction teams. Technological development needs to improve the quality and precision of prefabricated components, realize modular construction of prefabricated components with the advantages of prefabricated buildings, and realize standardized design, integrated decoration, information management and intelligent application. The construction and implementation of the standard system of prefabricated building design provides more systematic and standardized guidance for the design process of prefabricated building, and achieves the highest quality engineering design and construction [5]. In addition, technical innovation is needed for lifting and hoisting equipment. At present, the development of hoisting machinery is not perfect enough, and there are many places where manual intervention is needed. It is necessary to combine the standardized production of prefabricated parts, optimize the original design, effectively match prefabricated parts with hoisting equipment, improve the success rate of hoisting once and reduce the occurrence of safety accidents [6].

The most important point in developing science and technology is to increase the supply of talents. With the flourishing state of prefabricated buildings, the demand for talents in prefabricated buildings has increased obviously, so we should strengthen the cultivation of professional talents and the construction of talent team. This requires us to improve the vocational training system, build a complete and mature education mechanism for prefabricated building builders, cultivate professional knowledge and innovative spirit simultaneously, and give a good internship environment. For example, through school-enterprise alliance, colleges and universities set up related majors or courses, so that students can receive the knowledge of specialized prefabricated buildings and enterprises can provide a good internship environment.

5. Conclusion

Compared with the traditional construction mode of prefabricated buildings, modular buildings have higher

industrialization degree and engineering quality, more convenient construction, more flexible design, less pollution and more environmental protection.

The Huoshen Mountain and Thunder God Mountain hospital built in the epidemic stage last year played a very significant role, and they were quickly completed and put into use in a short time. Apart from the concentrated leadership advantages, outstanding architectural experience and the spirit of unity, the modular and prefabricated building technology itself also played a key role.

China is promoting the development of standardized design, which makes the construction industry vigorously develop building industrialization and modular construction. Therefore, modular construction is the inevitable result of the development of traditional prefabricated buildings, the product of the development of the times, and has a good development prospect. However, it is necessary to constantly improve standards and technical specifications, adhere to the concept of industrialization, continue to advance steadily, run through the idea of green buildings, and strengthen the training of talents, so as to further promote the development of prefabricated buildings.

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Research on Blasting Technology in Large Cross Section Roadway Heading in Hard Rock at Depth

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Abstract: According to the high hardness rock in Xinji 2nd Mine, the problem of low utilization of blasthole, an undesirable effect of blasting, and low circulating footage in the roadway construction has arisen. By analyzing the factors of the blasting effect in large section hard rock roadway excavation, it is to optimize the blasthole diameter, charge diameter, cutting modes, and other parameters of blasting. The results show that the improvement ensures good formation of large cross section roadway in hard rock while the heading speed and blasting efficiency are greatly enhanced by occupying the double wedge cut, increasing the number of ultra-deep middle cut, and expanding the diameter of the blasthole.

Keywords: Large Cross Section; Hard Rock Roadway; Double Wedge Cut; Excavating Blasting; Blasting Parameter; Influencing Factors

Introduction

At present, the method of borehole blasting is adopted to carry out roadway excavation in many domestic mines. The theory and technology of drilling and blasting in deep rock roadway are facing some new problems with the deep development of coal mining. The low efficiency of coal mine roadway excavation greatly affects the sustainability of production [1]. The main problem of roadway excavation is to realize the high quality of the production. Therefore, domestic scholars have done a lot of experimental researches on the optimization of blasting parameter and obtained some research results [2-4].

There are many problems in the roadway excavation of Xinji No.2 Mine, such as large rock hardness, low utilization rate of blasthole, blasting effect is poor, and low advance of working cycle. Based on the analysis of rock physical and mechanical properties and the study of blasting mechanism under high stress conditions, the blasting parameters of roadway excavation are optimized to solve above problems. Compared with old blasting scheme, the utilization rate of the borehole is increased from 80% to 93%, and the single-cycle footage is also increased from 1.6m to 2.0m.

1. Influence factors of blasting excavation efficiency

With the increase of mining depth, crustal stress, temperature and osmotic pressure of groundwater were also increased by conditions of three highs, such as the high stress, the high temperature, and the high osmotic pressure. Coal outburst, disasters are becoming more and more serious, which contains the gas outburst, the rock burst, and the rock blasting. the difficulty of blasting is increased by deep rock under the influence of high crustal stress. The factors affecting the blasting efficiency mainly include the physical and mechanical properties of rock and the selection of blasting parameters, such as cutting mode, hole depth, loaded constitution, initiation way) [5].

1.1 Physical properties of rock mass

In the roadway excavation, the physical and mechanical properties of the rock and the geological structure are the important factors to affect the blasting efficiency. Low blasting efficiency will happen for rock mass with high hardness, poor

drillability and explosiveness, and undeveloped joints. On the contrary, drilling and blasting are easier and the blasting efficiency is higher.

1.2 Cutting blasting

Cutting blasting is an important technical content in tunnel blasting engineering, and it is the main factor to determine the blasting footage and the utilization rate of borehole. The current roadway excavation cutting method and blasting parameters are basically according to past experience, and far from ideal cutting blasting effect. The current mode of cutting and the blasting parameters of roadway excavation are basically determined by the experience, which is far from the ideal cutting blasting effect. Therefore, it is necessary to choose reasonable mode of cutting and charge quantity to improve the utilization rate of borehole [6].

1.3 Borehole depth

The size of the hole depth affects the excavation work procedure of the workload and the blasting effect [7]. It is to determine the main factors of driving cycle in each shift. In general, it should increase the depth of the borehole to achieve rapid excavation, but the restriction of rock on borehole will increase, the utilization rate of borehole and the cutting effects will decrease obviously. So, it is necessary to choose the reasonable hole depth can improve the progress of the whole roadway excavation, and blasting effect.

1.4 Charge structure

Because this part of rock should not only be broken but also thrown out during blasting, it needs to consume more explosive energy. In order to improve blasting efficiency, cutting hole, satellite hole and bottom hole is given priority with continuous charging especially in solid rock, cutting hole of charge quantity of the need to improve; it can increase peripheral hole non-coupling coefficient to achieve smooth blasting [8].

1.5 Initiation mode

The practice shows that on, indirect initiation is safe and reliable under the premise of good jam and the gas in the mine. Indirect detonation can not only prolong the role of explosion products in hole, it also can reduce the harmful effect of blasting. Therefore, indirect initiation can be used to improve the effect of blasting in the roadway with no gas or less gas.

2.Test conditions and equipment selection

2.1 Test conditions

Field test is carried out in xinji 2nd coal electricity group company, the roadway excavation in this mine has large cross section and high hardness of rock. The rock is mainly coarse sandstone and medium coarse sandstone, which brings great difficulties to roadway construction. In excavating rock are coarse grained sandstone, rock coefficient is f = 10 ~ 12, the bedding is clear, and the joints are well developed. The buried depth of tunnel is – 650 m, the section is a straight wall semicircle arch, the excavation width is 4.2 m, the height of tunnel is 3.6 m, the excavation area is 13.23 m^2 . Using spray the anchor net supporting form, the thick of uneven paint coverage is 150 mm, row spacing between bolt of φ 18 is 800 × 800 mm.

2.2 Equipment selection

The air leg drill is used to drill in hard rock tunnel, but the drill stuck seriously and the drilling speed is slow. According to the quick roadway excavation requirements, the type 7655 air-rider jack hammer is chosen. The drilling is suitable on hard rock of horizontal drilling or inclined horizontal hole, and the drilling depth can be up to 5 m. In order to shorten the drilling time and the number of drilling machines at the same time, at least 4 drilling machines should be used at

the same time on the working face, and another one should be reserved. Hollow hexagonal steel drills with lengths of 2m, 2.5m and 3m and diameters of 22mm should be used for each drilling machine.

3.Excavation blasting technology research

3.1 Rock physical and mechanical performance test

Rocks from the construction of the working face, and carries on the physical and mechanical properties test, and provide the basis for the design of blasting scheme and improve. Mining area substation in excavating rock processed into standard specimens in the laboratory is to test, and the results are as follows: the density of rock is 2.47 ~ 2.57 g/cm3, Poisson's ratio is 0.25, elastic modulus is (1.6 ~ 3.0)×104 MPa, compressive strength is 75.0～121.0 MPa, tensile strength is 5.7 ~ 8.9 MPa, and longitudinal wave velocity is 3.5 ~ 4.2 km/s.

3.2 The depth of the borehole

Borehole depth is decided by the test requirements, the drilling machine drilling ability, workers operating level, security requirements of unsupported roof distance. Borehole depth should be adopted according to the on-site construction level by 1.8 ~ 2.3 m, circulating footage is expected to be 1.8 ~ 2.1 m. The vertical depth of cut eye, auxiliary cut eye and center eye is 100~200mm deeper than that of peripheral eye, two circle eye and three circle eyes.

3.3 Hole diameter and charge diameter

In construction of rock drilling and blasting method, the explosive is one of the important factors to determine blasting effect. According to the actual situation, USES the level 3 coal mine water gel explosive is used. The low utilization rate of borehole was considered in the implementation of medium-deep hole blasting and 27mm charge diameter. In order to improve the explosive energy and explosive transmission effect, the diameter of cut holes, auxiliary cut holes and center holes (12 holes) was changed from 32mm to 42mm, and the diameter of charge bag was changed from 27mm to 35mm. With the increase of charge diameter and uncoupling coefficient and the extension of stress wave action time, rock can be broken to a greater extent and blasting effect can be improved.

3.4 Cutting method and blasting parameter optimization

（1）The scheme determination of cutting

When the medium-deep hole blasting of about 2m is implemented, the cutting mode and borehole layout should be changed. The cutting way depends on lithology, equipment preparation and so on. Three pairs of wedge cut can be used for tunneling in broken rock of soft and hard rock with circulation progress less than 2.0m. The drilling rod with 2.2m specification is adopted, and the hole depth is about 2m. Double wedge cut was adopted, three pairs of wedge cut holes and two pairs of auxiliary wedge cut holes were arranged, with two central holes in the middle. The hole depth of cut hole is 100mm deeper than other holes, and the depth of center hole is 100mm ~ 200mm larger than cut hole. The Angle of cut hole should ensure that the distance between hole mouth and hole bottom strictly meets the design requirements. Drilling of soft and hard rock with circulation progress greater than 2.0m shall be carried out with drill rod with specifications above 2.0m. Cut mode and cut borehole layout including hole distance shall be carried out strictly in accordance with medium-deep hole blasting instruction to ensure blasting circulation footage.

（2）Determination of auxiliary hole and surrounding hole

Depending on the size of the section, there are two kinds of auxiliary holes, namely three circle holes and two circle holes, which are mainly used to continue to expand the cut. The spacing of the auxiliary holes is 600mm, and the auxiliary holes are arranged between the cut hole and the surrounding holes, and the direction is basically perpendicular to the working face, so as to ensure the uniformity of rock blocks falling by explosion and create favorable conditions for rock loading. The surrounding holes directly determine the forming quality of the roadway contour. Generally, the surrounding holes are

100mm away from the roadway periphery, and the stronger the rock is, the closer it should be to the periphery, and the spacing between the surrounding holes should not be too large, generally 400mm, in order to ensure the section contour of the roadway and minimize the amount of brushing or the quantity the sprayed cement liquid. The fundus of the auxiliary hole and surrounding holes should fall as far as possible on the plane of the same depth, so that the working surface of the explosion is relatively flat, which is conducive to the next drilling, and the residual hole left after the explosion is shallow.

（3）The arrangement of detonating sequence

In order to make cutting thoroughly, a free surface is provided for other explosive charge firstly. Three pairs of cutting holes are primed with one-stage detonator, two pairs of the auxiliary cutting holes and central holes are used with two-stage detonator, and the number of other holes is arranged from inside to outside with increasing delay detonator. The depth of the central hole is 100 ~ 200mm, which is larger than the cut hole, and a certain amount of explosive is properly loaded. The central hole plays the role of follow-up slag throwing, it improves the molding quality of the cavity and the rock-breaking ability at the bottom, expands the volume of the cavity, effectively breaks the bottom rock, makes the cavity more fully broken, deepens the effective depth of the cut, and strengthens the throw dregs effect. The section blast hole layout of the body is shown in Figure 1, and the selection of cutting blasting parameters is shown in Table 1.

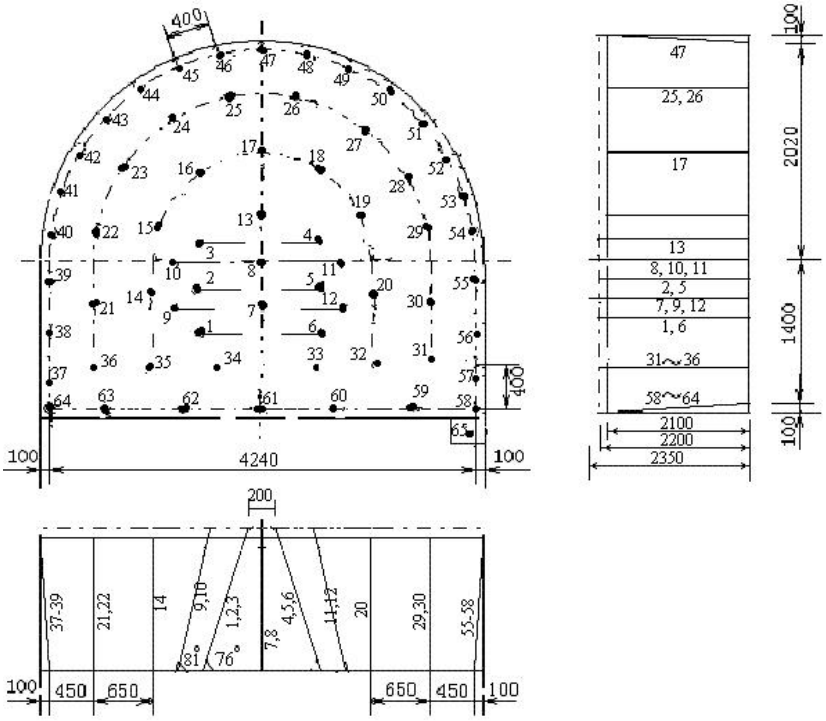

Figure 1 The layout of optimized blast hole

4.Test results analysis

Before the test, the cutting blasting method is six-hole wedge cutting, the diameter of all the holes is 32mm, the diameter of charge is 27mm, and the three-level water gel explosive permitted in coal mine is adopted. Before the test, the single circulating drilling footage is 1.6m, and the utilization rate of borehole is about 80%. After optimization, the new scheme adopts double wedge cut and a pair of central holes, the diameter of the hole is 42mm, and the diameter of the coal mine allowable secondary water gel explosive is 35mm.After blasting, the section forming and surrounding rock stability is better, and throw dregs is more reasonable. The borehole utilization rate is increased from 80% to 93%, and the single circulating drilling footage is increased from 1.6m to 2.0m. Statistical data of blasting effect measured on site are shown in Table 2.

Table 1 The optimized blasting parameters

Designation	Serial number	Hole depth	Pitch	Burden	The Angle		Charge quantity			Firing order	Connecting wat
					vertical	level	Number of holes	Single hole	Total		
Cut hole	1-6	2.2	400	1000	90°	73°	6	0.75	4.5	1	In series
Central hole	7,8	2.3	400	400	90 °	90 °	2	0.45	0.9	2	
Talus hole	9-13	2.3	500	200	90 °	81 °	5	0.75	3.75	2	
Three circles hole	14-20	2.1	650	650	90 °	90 °	7	0.50	3.5	3	
Two circles hole	21-30	2.1	650	650	90 °	90 °	10	0.50	5.0	4	
Bottom hole	31-36	2.1	600	400	87 °	90 °	6	0.60	3.6	4	
Surrounding hole	37-57	2.1	450	450	87 °	90 °	21	0.30	6.3	5	
Bottom hole	58-65	2.1	700	450	87 °	90 °	8	0.60	4.8	5	

Table 2 The optimized blasting effect of statistical data

Serial number	Project name	Unit	Quantity	Serial number	Project name	Unit	Quantity
1	Blast hole utilization factor	%	93	5	Loop detonator consumption	Unit	65
2	Circulating footage	m	2.0	6	The unit consumption of explosive	kg/m^3	1.21
3	Circulating solid rock volume	m^3	26.8	7	The unit consumption of detonator	$block/m^3$	2.43
4	Circulation explosive consumption	kg	32.35	8	Circulation blasthole length	m	138.0

5. Conclusion

From the actual blasting performance of explosive site, the performance of two-level coal mine permissible water gel explosive is better than that of three-level coal mine permissible water gel explosive. The performance of large diameter coal mine permissible water gel explosive is better than that of small diameter coal mine permissible water gel explosive. Therefore, from the point of view of blasting, large diameter two-level coal mine permissible gel explosive should be selected as far as possible, especially in the working face with low gas concentration and hard rock. In the soft rock working face can be considered to choose three-level coal mine allowable water gel explosive.

For deep large section hard rock roadway excavation, it is appropriate to adopt double wedge cut to overcome the constricted function, the rock groove holes position is easier to pull out. The depth and charge amount of the central hole

should be appropriately increased in the center of the groove hole, so as to better assist other groove holes to throw out the deep rock.

The test results show that model 7655 air-rider jack hammer is suitable for drilling horizontal or inclined horizontal holes on medium or hard rock, and the drilling efficiency is relatively high, which can be widely used in deep hard rock tunnel.

Aiming at hard rock construction conditions, the blasting design combining large diameter cutting to improve blasting effect and small diameter caving to improve drilling efficiency, not only ensures the forming quality of roadway but also speeds up the driving rate, and achieves the expected blasting effect.

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Research on Smart City Construction of Hangzhou Based on Big Data

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Abstract: Hangzhou has deeply cultivated the first-mover advantage of the Internet and become a typical example of the construction of a new national smart city. On June 28, 2020, Hangzhou Municipal Party Committee made the Decision on Strengthening and Optimizing the Urban Brain to Build an "Important Window" for the Construction of a New Smart City in China, which took the urban brain construction as the main starting point for digital empowered urban governance and comprehensively promoted the modernization level of urban governance. On March 1, 2021, the Hangzhou Municipal Brain Enabling Urban Governance Promotion Regulations will also be formally implemented, which is China's first local legislation on digital intelligence governance. The introduction of the Regulations provides a solid legal escort for the future digital reform in Hangzhou.

Keywords: Big Data; Smart City Construction; Hangzhou

1. Smart city definition and big data concept

Smart city refers to the use of artificial intelligence technology to form a data-driven urban decision-making mechanism. According to real-time data and various types of information, public resources of the city can be allocated and regulated, and finally automatic intelligence can be realized to achieve the optimization of urban operation efficiency. There are two key factors in the construction of smart city: first, the new generation of information technology represented by the Internet of Things, cloud computing and mobile Internet, namely the technical factors at the level of technological innovation; The second is the open city innovation ecology which gradually breeds in the knowledge society environment, namely the social and economic factors of the social innovation level [1].

Big data refers to the data set that cannot be captured, managed and processed by hardware and software within an affordable time. New processing modes are needed to make the data set become a massive and diversified information asset with stronger decision-making power, insight and process optimization. Big data with large capacity and a lot of types, access speed, high application value as the main characteristics, first used in the IT industry, is currently in rapid development for a huge number, source dispersion, format a variety of data acquisition, storage, and correlation analysis, discover new knowledge and create new value, promote new ability of a new generation of information technology and services business.

2. Present situation and achievements of construction

2016 "urban brain" was born in Hangzhou, under the impetus of the "three integration", from the local exploration of traffic rule, to the important across of fully cure the city, then to the deepening application in the prevention and control of COVID - 19, city brain has played a very important role, make the wisdom of Hangzhou city realized leap-forward development, promote the modernization of Hangzhou governance process. During his visit to Zhejiang, General Secretary Xi Jinping fully affirmed Hangzhou's urban brain, requiring Hangzhou to continue to explore and innovate, further tap its development potential, speed up the construction of a smart city, make the city smarter and more intelligent, and create more generalizable experience for the whole country[2].

At present, Hangzhou has formed a multi-node regional layout with Yuhang, Binjiang and West Lake as the core, including Xiaoshan, Qiantang New Area, Tonglu and other districts, each with its own characteristics. A platform system has been formed, with the National Independent Innovation Demonstration Zone as the main driving force, the Science and Technology Innovation Corridor in the west and the Intelligent Manufacturing Corridor in the east as the two wings, and the featured towns and the mass innovation space as the support. With Alibaba, Hikvision and H3C as the leading companies, listed companies and unicorn companies as the backbone, and "mass entrepreneurship and innovation" as the support, Wild goose shaped enterprise group has been formed.

According to "2019 Urban Digital Development Index Report", Hangzhou's total index ranks first in China; In the Comprehensive Evaluation Report of Digital Economy Development in Zhejiang Province 2019, Hangzhou continues to top the list with 141.9 points. There are six districts, counties (cities) in the province with more than 100 points in the first echelon. Binjiang District, Yuhang District, Xihu District, Xiacheng District, and Jianggan District of Hangzhou are in the top five. In the Report on Digital Governance of Chinese Cities (2020) released by relevant national institutions in August 2020, Hangzhou ranked first in the level of digital governance of cities in China, becoming the first city in digital governance [3].

2.1 Intelligent transportation

Hangzhou Smart Transportation has built a number of information systems based on the command center. The function of the comprehensive traffic information command center has been continuously improved, and the linkage function with the command centers of various districts, counties and cities has been added. The three-level emergency command support system has been further improved. The integrated traffic information law enforcement system has realized the coordinated law enforcement and network monitoring system covering the city's waterway, highway and road administration law enforcement categories. Intelligent port and navigation section management system uses a variety of sensing equipment to automatically identify, automatically capture and automatically judge whether the ship is seaworthy, which effectively improves the management efficiency.

On the basis of more than ten years of information construction, Hangzhou traffic has carried out the idea of "data running more, people running less", actively promoted the reform of "running at most once" and actively implemented the "six handling", namely "online handling", "one card handling", "one window handling", "mobile handling", "self-service handling" and "light handling", and developed the self-service machine for traffic matters, which has provided more options and convenience for the masses to handle affairs.

In recent years, mobile payment has developed rapidly and become the main method of payment for Chinese cyber citizens. As the first city in China to realize "code scanning for bus and subway ride", Hangzhou Bus has realized mobile payment covering the whole city, Hangzhou Metro has realized the function of electronic payment directly through the gate, and Hangzhou ETC has made high-speed passage smoother. These have brought convenience, benefits and safety to more citizens and tourists.

In addition, "do not queue, do not lift the bar, do not scan the code", All 69 parking poles in Hangzhou West Lake scenic area are laid off. The "leave before you pay" policy reduces the entrance time from 20 seconds to less than 2 seconds. Hangzhou, the first city in China to remove parking poles, has received 92.5 percent of parking levers [4].

2.2 Smart medical care

In order to solve the problem of the difficulty and annoyance of getting medical treatment under the traditional medical treatment mode, Hangzhou has implemented the smart medical treatment, which is mainly reflected in the aspects of whole process coverage, full self-service, full circulation service and full self-service medical treatment, which has greatly improved the service level at all stages of medical treatment. This also makes Hangzhou the first city in China to realize the whole process of medical treatment with an electronic social security card. At the end of 2018, the first domestic hospital with the "full process face-brushing for medical treatment" was launched in Yuhang District of Hangzhou.

Hangzhou takes the measure of booking registration on the Internet at different times before seeking medical treatment, and sets different registration methods for different groups of people to achieve timely medical treatment. At the same time,

inter-hospital settlement and full self-service are implemented to shorten the traditional process of medical treatment. In addition, the realization of city-wide access to medical records and the delivery service of cloud pharmacy to patients' homes have provided convenience for the people in terms of more services and improving people's livelihood.

For the prevention and control of COVID-19 epidemic, Yuhang District of Hangzhou has created a "1+1+1+N" sophisticated intelligent control model at the grass-roots level. One code, one digital platform, one thing and N emergency plans make epidemic prevention and control more precise, more intelligent and more efficient.

2.3 Wisdom government affairs

According to the Survey and Evaluation Report on Online Government Service Capability of Provincial Governments and Key Cities (" Good or BAD ") (2020) released by the E-Government Research Center of the Party School of the CPC Central Committee (National Academy of Governance), Hangzhou is ranked second in online government service capacity of key cities. In the new journey of building an "important window", Hangzhou is promoting the construction of a digital government in an all-round way, striving to provide zero-distance services and "one-stop service"[5].

For example, in the office hall module of "Hangzhou science and technology brain", you can apply online for work permits for foreigners in China, identification of provincial technology-based small and medium-sized enterprises, and inquire about provincial science and technology awards, key research and development projects, etc. Each business list has a "guide to work", and the work realizes "one-button navigation".

2.4 Wisdom green

In the past, it took two to three hours for Hangzhou Dajiangdong to collect data on the concentration of enterprises' exhaust emissions, and since 2018, environmental protection departments have only needed one minute to get results through the use of new equipment, which has changed the feedback lag in the past and realized the transformation from "civil air defense" to "technical defense", reducing environmental pollution control to the "last kilometer".

On the other hand, several communities in Hangzhou have started to use smart garbage sorting and collection bins. There is no need for special person on duty, no need for special bags -- the system can track the person who put it through weight measurement and ID identification matching, accurate measurement, automatic monitoring and cloud management can be implemented, and environmental awareness can be promoted on the smart screen of the dustbin and the dustbin itself through the media.

3. The uncertainty in the construction

3.1 There are uncertainties in the management and control of information security

Smart city is a complex system composed of multiple subsystems, which are interrelated and interact with each other. Even if the information of each subsystem is secure, it cannot represent the information security of the whole system. In a smart city, the government needs to collect citizens' personal information to provide more accurate services. The major application software also takes information collection as the premise for citizens to enjoy its services, and the scope of information collection is increasingly extensive. If the information security in a smart city is not guaranteed, the life of residents will be affected to varying degrees, and the life safety of residents may be threatened in serious cases. All kinds of information in a smart city are interconnected. Once information security is not properly controlled, a large amount of information and privacy are likely to be leaked, leading to a series of chain reactions. Smart cities are highly dynamic and heterogeneous, and the traditional network security technology is no longer applicable. Users in smart cities are more complex and diverse than those in other systems. Users' uneven information literacy and lack of awareness of network information security will weaken the ability of various technologies to control information security, making it more difficult for users to prevent information security threats.

3.2 There are uncertainties for older people living in smart cities

In smart city, elderly users may find it difficult to recognize and understand some complex or abstract dynamic icons in the interface due to their low level of familiarity with emerging Internet information and their eyesight begins to decline. Therefore, it is slow and difficult for them to obtain information. Because some elderly users are not familiar with the various operations on the mobile phone, they are prone to encounter various operational difficulties when traveling by car or entering and leaving some indoor places, and still cannot complete a series of operations independently when seeking medical treatment or shopping.

3.3 There are uncertainties in the long-term development of the smart parking industry

In the next few years, the demand for parking spaces in Hangzhou will continue to rise, and there is a huge space for the development of the smart parking market. The bright development prospect and high profit margin of its smart parking market also make many potential entrants covetously for this "big cake". Moreover, the low threshold of smart parking hardware equipment makes the transformation cost not high, and the market entry threshold is low. Many small enterprises also want to enter the market, resulting in small scattered market participants and scattered market competition pattern, which has a negative impact on the long-term healthy development of smart parking industry.

4. Construction suggestions

4.1 Innovate technology and strengthen control

Continuously innovate the technical means of information security management and control to meet the security needs in encryption, authentication, intrusion monitoring and privacy protection. We will comprehensively implement a system of hierarchical information security protection and risk assessment, strengthen the development of a network security protection system, and conduct regular security inspections of information systems. Establish the preparation and exercise of emergency plans for key information systems, and improve the ability of emergency handling of information security incidents.

4.2 Integrate the construction concept of "suitable for aging"

The complex information of the network interface should be simplified. The interface design should try to avoid too complicated background pattern and pay attention to the integrity of the tone. For abstract or dynamic icons, text and voice explanations should be carried out to help the elderly understand. Enlarge the icons and text spacing appropriately, which helps the elderly to identify and operate the selection. In addition, more courses to teach the elderly how to use smart phones can be carried out in communities to make it more convenient for them to travel, seek medical treatment and go shopping.

4.3 We will improve regulations and policies on building smart cities

"Hangzhou city brain" should start from the whole society, not only through digital reform to build the whole government, but through the data sharing to connect governance subjects across the economic, political, social, cultural and ecological domains. In legislation and policy, more explicit provisions should be made on the property rights of data, the relationship between digital governance and personal privacy, so as to achieve overall intelligent governance.

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Analysis of Pedestrian Characteristics in Urban Integrated Transportation Hub Station

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Abstract: As the theoretical research of pedestrian walking environment planning for safety, efficiency and comfort has become a hot research topic in recent years, the analysis of pedestrian characteristics in integrated traffic hub stations has become an indispensable content in the research of pedestrian flow. Research on pedestrian characteristics can help improve the hub The service level of the facilities in the station. In view of this, this article analyzes the pedestrian path selection, behavior walking characteristics, queuing characteristics and waiting characteristics in the hub station. The analysis results can provide a reference for the optimization of the facility layout in the hub station.

Keywords: Urban Traffic; Hub Station; Pedestrian Characteristics

Introduction

The planning and construction of integrated traffic hubs has therefore attracted widespread attention from the industry. In recent years, with the rapid increase in people's travel, more and more problems have arisen in the operation of integrated transportation hubs, and the available space within the hub has decreased sharply. How to organize and guide the pedestrian flow within the hub reasonably and effectively to improve the hub The efficiency of the station's traffic has become a hot topic for discussion and research among industry insiders and scholars. In the hub, pedestrians are the main body of all activities, and various facilities need to meet the needs of pedestrian walking and other activities. This requires managers to fully grasp the activity status of pedestrians in the hub, the distribution situation, and the interior of the hub under different crowd densities. The state of use of the facility [2].

1. The significance of analyzing pedestrian characteristics

The research on pedestrian characteristics is highly pertinent. Pedestrian traffic characteristics are affected by many factors. Different scenes and different groups of people will affect the behavior of pedestrians in the station. The behavior of pedestrians in the same scene is not the same. By analyzing the behavior of pedestrians in the hub station, the law of pedestrian flow is better. It is of great significance to grasp the rules of pedestrian flow in the hub station.

In recent years, with the increase in passenger traffic, the pressure on transportation hubs has increased, and the problems that have arisen are also increasing. For this reason, many domestic scholars are committed to the research of integrated traffic. Among them, the use of computer simulation technology to simulate pedestrians inside the hub has become a research hotspot, and the research of pedestrian characteristics is an indispensable part of pedestrian simulation modeling. At the same time, it is also an important basis for model verification and simulation results evaluation.

2. Spatial constraints of pedestrian path selection

Path selection is an important decision-making behavior of pedestrians. On the ground, the path of pedestrians is almost unrestricted, and path selection is very random. In the hub, due to the limitation of circulation, the pedestrian macro path is

basically fixed, and there is no need to make complex macro-level path selection. Pedestrians only need to make partial adjustments to the path according to the determined activity chain. In addition, the choice of pedestrian paths inside the hub is also constrained by space. In the hub, due to the limitations of physical facilities such as walls, pedestrians' vision is limited to a small area, and the information that pedestrians can obtain is limited. At this time, pedestrians' familiarity with the environment directly affects the rationality of their decision-making.

3. Research on Pedestrian Behavior Characteristics

Foreign research on pedestrian behavior characteristics has progressed rapidly in just a few decades, and it has shifted from the initial macroscopic characteristics research to the more complicated pedestrian microscopic characteristics research. The research on the characteristics of pedestrians in the hub has also gone from the original pedestrian flow organization and management, emergency evacuation to the analysis of the behavior characteristics of individual pedestrians.

Domestic research on pedestrian models is mainly based on existing foreign models and improvements for different application scenarios. Most of them are based on cellular automata models and are mainly used in emergency evacuation and pedestrian crossings. On the one hand, there are relatively few studies on pedestrian modeling in transportation hubs. At present, these applications are based on the characteristics of my country's traffic and specific application scenarios to improve the existing models to improve the effectiveness of the model.

3.1 Analysis of pedestrian speed characteristics

Speed is an important indicator reflecting the characteristics of pedestrian traffic. Under the same environmental conditions, individual differences determine the changes in its speed characteristics. Free speed refers to the walking speed of pedestrians in a non-crowded state, that is, when the pedestrian's walking space is not restricted and is not interfered by other factors. The difficulty of free speed measurement is to determine whether the pedestrian is in a free walking state.

In scientific research, it is often necessary to study the influence of different experimental conditions on the experimental results. For this reason, it is necessary to scientifically analyze the experimental data to identify the impact of various experimental conditions on the experimental results. ANOVA is to deal with this type of Effective method of problem.

3.1.1 Gender factors

Physical condition is an important factor that affects pedestrian speed. Male speed is generally higher than female speed. In order to verify whether gender has a significant influence on speed, the speed in the upward and downward directions of the horizontal passages and stairs in the integrated hub can be determined by gender. A one-way analysis of variance for influencing factors shows that gender has a significant impact on pedestrian speed.

3.1.2 Facility factors

Comparing the speed and distribution of pedestrians on the horizontal passage and stairs, it can be found that the speed of pedestrians in the horizontal passage is higher than the speed at the stairs, and the fitting effect of the normal distribution of the speed of pedestrians on the stairs is worse than that of the horizontal passage. The type of facility has a certain influence on the walking speed of pedestrians, and the speed of pedestrians on stairs is more obvious than individual differences in horizontal passages. A one-way analysis of variance was carried out on the speed of men and women with the type of facility as the influencing factor, indicating that the type of facility has a significant impact on the speed of pedestrians.

3.1.3 Other factors

In addition to gender and facility types, there are many factors that affect pedestrian speed, which are often difficult to measure. Pedestrians' walking speed decreases with the decrease of their fitness level, and because their fitness level cannot be measured, in related studies, the influence of age on speed is usually used to replace the effect of fitness level. Due to differences in regional culture, the behavior of pedestrians in different regions shows differences. Researchers generally

believe that the minimum acceptable space for Asians is lower than that for Americans and Europeans. In addition, the purpose of pedestrian travel has a certain impact on the speed of pedestrians. In view of the difficulty of measuring such influencing factors, no further discussion will be made.

3.2 Overview of pedestrian behavior

The various behaviors of pedestrians can be regarded as a decision-making process. Decision-making can be a macroscopic view of a certain behavior as a whole, or it can be microscopically penetrated into every small link. Therefore, clarifying the decision-making process of pedestrians is the basis for studying pedestrian characteristics. From a psychological point of view, the decision-making process of pedestrians is a complex process of real-time information interaction with the environment. In this process, pedestrians obtain information from the environment for selection and processing, and then make decisions.

3.2.1 Decision-making layer

The strategic level is the macroscopic grasp of pedestrians' behavior within the hub, that is, at this level, macro decisions are made. Pedestrians determine the activities that need to be carried out in the hub according to their own travel purposes. Some of these activities are necessary, such as purchases. Some of the tickets are arbitrary, and this series of activities constitutes a collection of pedestrian activities. It can also be said that what the strategy layer has to do is to decide whether to make a certain activity or not.

3.2.2 Tactical layer

At the tactical level, pedestrians arrange the time sequence of various activities according to their actual conditions according to the set of activities determined by the strategic level, forming an activity chain, and at the same time, the macro path of pedestrians inside the hub is generated.

3.2.3 Operation layer

The operating layer is the pedestrian's specific completion of the walking process from the starting point to the ending point, during which some of the pedestrian's micro characteristics are displayed.

4. Analysis of pedestrian walking characteristics

4.1 Turning characteristics

When turning inside the hub, pedestrians tend to walk close to the inner side of the curve with the shortest path. Pedestrians are concentrated on the inner side of the curve, which makes the inner pedestrian denser and the outer pedestrian more scattered and less dense.

4.2 Obstacle avoidance characteristics

Pedestrians avoid obstacles and other pedestrians to generate microscopic movement trajectories. Pedestrians' trajectories inside the hub are more complicated than road traffic. The goal of pedestrians is to walk on the shortest path while avoiding collisions with obstacles and other pedestrians.

4.3 Analysis of the characteristics of pedestrian queuing

Pedestrian queues include two types: ordered queues and unordered queues. Ordered queues often appear in service windows or specific areas where there are staff to maintain order. Disordered queues often appear at the bottleneck of various passages and other walking facilities.

Conclusion

This paper analyzes the pedestrian path selection, behavior walking characteristics, queuing characteristics and waiting characteristics in the hub station, considering the pedestrian turning characteristics, obstacle avoidance characteristics, pedestrian queuing characteristics and waiting characteristics, etc.; because the research object is thinking and active Pedestrians, research work is more complex and uncertain than vehicle traffic, this paper still has many deficiencies in the research of pedestrian traffic characteristics inside integrated traffic hubs.

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Study on Passenger Transfer Based on the Design of Underground Transportation Hub of Xi'an Railway Station

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Abstract: The current focus of traffic construction in China is the transportation hub. The building of modern, comprehensive three-dimensional (3D) transportation hubs plays a key role in the establishment of a modern transportation network. It is vital to consider factors like passengers and traffic circulation plan in the design of comprehensive transportation hubs. However, due to unreasonable design, problems such as inappropriate traffic circulations, the long transfer distance between various means of transportation and the complexity of transfer routes, emerge on occasion. To solve these challenges, taking the Underground Transportation Hub of Xi'an Railway Station as an example, this paper studies the design of comprehensive transportation hub from the perspective of passengers and the design of traffic circulations, and is expected to provide reference for the design of comprehensive hubs in the traffic field.

Keywords: Comprehensive Transportation Hub; Traffic Circulation; Transfer, Stream Circulation Design; Traffic Organization

Introduction

The 13th Five-Year Plan for the Development of a Modern Comprehensive Transport System states: The building of a number of modern and three-dimensional comprehensive passenger transport hubs will make passengers' transfer more convenient.

As an active attempt of "modern, comprehensive three-dimensional passenger transport hub", the Xi'an Railway Station Underground Comprehensive Transportation Hub is a large underground comprehensive transportation hub connecting high-speed railways, subways, buses, taxis, online hailing cars and private cars.

1. Key Points of Traffic Circulation

The key of organizing traffic circulations in transportation hubs is about management of various vehicles, analysis and arrangement of different traffic lanes. Therefore, the design should not only meet the needs of receiving and hauling passengers and parking various vehicles, but also can ensure safe and smooth traffic in the hub, especially to avoid the intersection of traffic circulations as much as possible.

The modes of transportation in the underground hub can be subdivided into: Passenger-hauling private car, passenger-hauling online hailing cars, passenger-hauling taxi, passenger-receiving private car, passenger-receiving online hailing cars, passenger-receiving taxi, bus at departure station, bus at intermediate station, etc., so the requirements of traffic flow vary among different vehicles. As a result, the design of each lane should be customized according to their characteristics. The circulation organization of various vehicles are as follows [1].

(1) Private cars to haul passengers: enter with passengers--passengers get off when stopping at the curbside platform--leave without any passengers.

(2) Online hailing cars to haul and receive passengers: enter with passengers--passengers get off when entering the Online hailing cars park--wait for being hailed--receive passengers--leave with passengers.

(3) Taxis to haul and receive passengers: enter with passengers--passengers get off when stopping at the curbside platform--a or b.

a: leave without any passengers.

b: Return to the free taxi storage yard--receive passengers if there are passengers in the boarding area--leave with passengers.

(4) Private cars to receive passengers: enter without passengers--enter the park and wait--receive passengers--leave with passengers.

(5) Bus at the departure station: enter with passengers--passengers get off when the bus stops at the drop-off platform--enter the public transport parking place without passengers--receive passengers at the departure station--leave with passengers.

(6) Bus at intermediate station: enter with passengers--passengers get off when the bus stops at the drop-off platform--leave with passengers.

After sorting out the demand of traffic circulations, it is also necessary to merge and integrate various passenger circulations in accordance with the restrictions on land use in order to build a hub with intensive land use, reasonable circulations and complete functions.

2. Design of the Traffic Circulation for Underground Traffic Hub of Xi'an Railway Station

2.1 Land Conditions of the Hub

The Underground Traffic Hub of Xi'an Railway Station is located between the Tang Daming Palace Ruins Park and the renovated and expanded Xi'an Railway Station, and its north side is 50 meters away from Danfeng Gate. It is about 120 meters wide from south to north and 1000 meters long from east to west. Considering the project is located in the south of the Daming Palace Ruins Park, in order to better protect this world heritage, the ground is designed as the Danfeng Gate Square just for pedestrians, and the transportation hub functions are all arranged underground [2].

2.2 Horizontal Design of the Hub

Based on the analysis of vehicle circulations and various constraints, the project is finally designed to be an all-underground transportation hub with five floors underground.

The ground of the hub is Danfeng Gate Square of Daming Palace Ruins Park, which is just for pedestrians.

The underground is divided into five floors, and the functions are:

The first-floor underground is functioned as passenger-hauling. Passengers can reach the hub by various means of transport. After they get off, they can take escalators to the ground, where they are able to check in. It is equipped with curbside platform, intermediate bus station and bus terminal.

The second-floor underground is mainly used for receiving passengers, where they can leave the railway station by various vehicles. Passengers can go to the sunken transfer square on the second floor through the underground exit passage, and then choose a means of transportation to leave the commuter station. There is bus waiting hall, taxi storage area, taxi pick-up area, reserved subway entrances and exits, car parking garage, etc.

The third floor is a car parking garage. The fourth and fifth floors underground are reserved subway station halls and platforms [3].

2.3 East-west Circulation Specification of the Hub

The project has two accesses on the east and west sides and there are four major types of traffic circulations, namely eastern bus circulation, eastern car circulation, west bus circulation and west car circulation. Buses run in the outer circle east-west, and cars run in the inner circle, forming independent double C-shaped passages east-west.

2.4 Bus Circulation

Buses on the west side enter the negative first floor through the access ramp. They enter the bus parking area after sending passengers off at the intermediate bus station and go to the west after picking up passengers at the departure station. The bus circulation on the east side is similar to that on the west side. East-west transit buses pass through the underground transportation hub, sending passengers off and picking up passengers on the intermediate bus station.

2.5 Taxi Circulation

The taxi enters the first underground floor from the entrance ramp, and can leave directly from the exit ramp after sending passengers off at the curbside platform. Or they can go down and wait in the taxi storage area on the second-floor underground, enter the taxi pick-up area, and go up to the floor underground to leave from the exit ramp after picking-up passengers. Circulations on the east side and the west side are basically symmetrically arranged [4].

2.6 Hailing Car Circulation

Hailing cars enter the first floor underground from the entrance ramp, then go to the car parking area from the ramp down to the second floor underground to send passengers off, and get into the parking space to wait for passengers. After being hailed, they pick up passengers and go up the ramp to the first floor underground and leave from the exit ramp. Circulation on the east side and the west side are basically symmetrically arranged.

2.7 General Vehicle Circulation

The drop-off Circulation (park temporarily and leave as soon as possible): general vehicles enter the negative first floor from the access ramp and leave from the exit ramp after passengers get off at the curbside platform.

The pick-up circulation (entering parking area): general vehicles enter the first floor underground from the entrance ramp, next go to the car parking area from the ramp down to the second floor underground to wait, and then get into the first floor underground through the ramp and leave from the exit ramp there after picking up passengers. Circulations on the east side and the west side are basically symmetrically arranged [5].

3. Key Points of Passenger Circulation Plan

The comprehensive transportation hub connects different means of transportation. Accordingly, the pedestrian circulations inside are various, so the space design of pedestrian circulations is far from a simple superposition of several elements, and it should be made in accordance with certain rules. Basic principles of the design include: clear structure; bus priority; separation of passengers and vehicles; reasonable design of space.

3.1 Clear Structure

According to the principles of Gestalt Psychology, people prefer to perceive the whole space through parts in isolation. To be more specific, facing a complex space, people prefer to consider it as a common, known, complete space for better understanding. Therefore, the complex structure of the space will make new passengers lost, resulting in erroneous judgments.

A space with a clear structure should be clean and uncluttered, where passengers are familiar with its functional zones and can understand it quickly. So, they can instantly identify and choose the transfer passage in this condition [6].

3.2 Bus Priority

As a transportation building used by the public, comprehensive transportation hubs enjoy a public attribute in nature that also owned by cities, so it's necessary to comprehensively consider the needs of different groups. In the arrangement of traffic stations, it is essential to place them from near to far according to their public characters.

3.3 Separation of Passengers and Vehicles

The principle of passenger-vehicle separation is the key to ensure passengers' safety and improve the transfer efficiency. The transportation hub building is inherently complex, where vehicles are running intensively. If passengers and vehicles are not separated and jumbled together, it is prone to accidents, because factors such as passengers moving cross the road, and vehicles stopping to wait and pick up people, will reduce the operation efficiency of the hub.

3.4 Reasonable Design of Space

A transportation hub is a building with a large flow of people, so it calls for sufficient space. However, restricted by investment, land, specifications and so on, the design cannot be over-sized, so it is very important to accurately calculate the area or length of each part in the space [7].

4. Design of Passenger Circulation for Underground Traffic Hub of Xi'an Railway Station

The Underground Hub of Xi'an Railway Station is designed according to the four basic principles of "clear structure, bus priority, separation of passengers and vehicles, reasonable design of space". Its characteristics are as follows:

4.1 Clear Structure and Bus Priority

The Underground Hub of Xi'an Railway Station is equipped with entrances and exits in each floor. According to the design concept of Xi'an Railway Station that "entrance on the ground floor, while exit underground", the first floor underground of the hub is designed for passenger-hauling with curbside platforms, intermediate bus stations and a bus terminal. Passengers arrive at this floor by means of transportation. Then they can get off and enter the railway station through the escalator on the ground.

The first-floor underground is designed in the manner of "independent and distributed pattern" without a hall for massive transfer. The pedestrian platform is independently arranged between the traffic lanes like an "island". Passengers go directly to the ground through the escalators in their respective islands and enter the railway station together in the ground concourse. This design not only meets the demand of the length of the curbside platform of different vehicles, but also avoids the intersection of passengers and vehicles.

The second-floor underground is for picking up passengers, which has the same elevation as the exit passage underground of the railway station. Passengers arrive at the hub from the exit passage underground of the railway station and then leave by various means of transportation there. There is bus waiting hall, taxi storage area, taxi pick-up area, reserved subway entrances and exits, car parking garage, etc. [8]

The second-floor underground is designed by the "concentrate dispersion" pattern, and passengers are distributed into various traffic stations step by step following the principle of "bus priority". The mode at the first level is pedestrian traffic, passengers of which are directly diverted in the sunken transfer square, where they can see the escalator on the ground. The transfer distance is 50 meters, and the transfer time is less than 1 minute. The bus and subway that with the strongest public character are at the second level. Their entrances are close to the transfer hall, and passengers can notice it immediately upon entering the hall. The transfer distance is 90 meters which takes about 1 minute to go. At the third level, there is the taxi, which is next to the bus and subway in terms of its public character. The transfer entrance is connected with the transfer hall through a short channel. The transfer distance is 110 meters and the time is about 1.5 minutes. At the fourth level, there are the online hailing car and private car with the weakest public character. The transfer distance between the connecting passage of the transfer entrance and the staircase of the building is 200 meters, and the transfer time is about 2 minutes.

4.2 Separation of Passengers and Vehicles

The design takes three methods of "plane separation", "same-floor interchange" and "hierarchical interchange" to separate passengers and vehicles.

The plane separation means to use the platform and railings of 150mm (car) and 200mm (bus) higher than the lane to divide the semi-independent safety space of the whole pedestrian, in which passengers and vehicles cannot cross the boundary at will, so they are separated. At the same time, the safety of passengers and the efficiency of vehicle passage are guaranteed [9].

The same-floor interchange is used when intersections of passengers and vehicles happen frequently. The pedestrian interchange in the space on the same floor enables passengers and vehicles to cross, and the space is divided into an upper part and a lower part. This mode is used in the passenger loading area of taxis, where the passengers go up and down the pedestrian interchange through a ramp, and the taxi passes under the interchange bridge. Therefore, they are completely separated.

The hierarchical interchange organizes passengers and vehicles with the upper and lower floors. This mode is used in the bus pick-up island. Passengers can identify the bus they are going to take on this floor and then reach the bus pick-up island on the upper floor by escalator, and buses pass on the upper floor.

Conclusion

The comprehensive transportation hub is a kind of multi-functional transportation building. Its design is complex, among which the passenger and vehicle circulations design is the key to its whole construction [10].

The crucial point to the design of vehicle circulation is that the circulation itself is simple, and different circulations won't be crossed. While the key point to the design of pedestrian circulation is clear separation structure, bus priority and avoidance of crossing between passengers and vehicles.

Following the basic principles of passenger and vehicle circulations design, and taking the Underground Transportation Hub of Xi'an Railway Station as an example, this paper analyzes the transfer design of comprehensive transportation hub, and suggests feasible modes, which provides reference for the design of comprehensive hubs in the traffic field.

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Research on the Development Mode of Yangtze River Delta Region under the Background of Urban-Rural Integration---From the Perspective of Suzhou

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Abstract: With the implementation of China's Yangtze River Delta integration strategy, the comprehensive strength of the Yangtze River Delta region has been continuously improved, but it is also facing increasingly severe challenges. Under the background of accelerating development, increasing contradictions and imbalance, it is particularly important to solve the problems of adapting urban and rural development modes to each other, narrowing the regional gap in various aspects and speeding up the integration process of the Yangtze River Delta. Taking the Yangtze River Delta region as the research object, this paper discusses the current mode of urban and rural development in China, and analyzes the important measures that Suzhou city should take for urban and rural development under the background of integrated development.

Keywords: Yangtze River Delta Integration; The Separate Urban-Rural Structures; Suzhou

1. Introduction

With the continuous development of civilization and history, China has gradually formed two completely different forms of human settlement, namely city and country. A city is a densely populated place that undertakes various economic and social functions and is the center of a regional system. Cities make use of the manpower and material supply of the countryside, forming a more prosperous scene than the countryside, which has great attraction to the rural surplus labor force. Rural area is a place with relatively scattered population, mainly agricultural land, and most residents are engaged in agricultural planting and breeding (Alexander, 2010). Rural areas carry out the simplest material production and life, generally located at the edge of the regional system, and continuously provide blood supply to central cities, which is the main source of irreplaceable human and material resources for cities (Beard, 2018).

2. The contradiction and bad result of binary division development

The huge difference in the way of life and production between urban and rural areas has gradually widened the gap in the level of development between them. In the early stage, China was in a long-term state of urban-rural dual structure governance and construction, and there were also some problems in urban planning. The planning aims at the rational development of individual cities and ignores the development prospects of rural marginal areas. The vision of planning is extremely narrow, and regional studies of urban development are often ignored (Wang and Zhou, 1999). With the continuous development of the separation of urban and rural construction, the contradiction between urban and rural areas is becoming increasingly prominent. For example, when cities need to expand the scale of land use, rural land will be invaded, and agricultural land will be forced to continuously convert to urban land, resulting in a sharp decline in rural productivity and lagging rural development. In serious cases, permanent basic farmland may even be violated, directly affecting national food security (Ottensmann, 2016). Then when the city grows to a certain size, the villages attached to it will no longer be able to meet the city's supply. At this time, backward villages will in turn restrict the development of cities, forming a vicious circle in which both cities and villages cannot get corresponding progress.

3. Analysis of the advantages of integrated development

3.1 Overall planning, regional first

Urban and rural integration development model can solve urban and rural development problems at the regional level, considering a more comprehensive range. In the integration model, urban-rural development contradictions are regarded as regional contradictions (Ruijgrok, 2006). Using the idea of urban feedback to the countryside and rural supply to the city can gradually solve the contradictions in the region. The overall plan also better reflects the public interest and better interprets the city's purpose of serving its residents. Urban and rural areas are not only the geographical scope of regional social and economic development and the establishment of a new economic order, but also the basic unit to adhere to green environmental protection and sustainable development. To achieve green ecological environmental protection and sustainable development, we also need to seek solutions at the urban and rural levels.

3.2 Resources integration, orderly development

The integration of urban and rural development is conducive to the local government's macro grasp of regional resources and advantages, and is conducive to the systematic sorting and integration of resources. Urban and rural development is not only related to the development stage, but also to the current regional economic aggregate and comprehensive strength. Development should not be blindly divorced from reality, nor should development be restricted by falling behind the status quo. The integration of urban and rural development is conducive to the orderly investment of regional capital. Generally, traffic facilities are built first, and then corresponding commercial facilities are built to introduce people and consumption. In order to meet the needs of urban and rural development, it is necessary to consider the integration of urban and rural areas in the long run and ensure the planning and construction of infrastructure, the timing of project development and the step-by-step investment of capital.

3.3 Transportation links, green development

The level and prospect of urban and rural development are closely related to the quantity and quality of regional resources. To realize the healthy and sustainable development of urban and rural areas, we must consider the allocation and utilization of resources. The integrated development mode of urban and rural areas makes the connection between urban and rural areas closer, and the flow of goods and personnel between urban and rural areas is also more intensive, which plays a positive role in the development of transportation between urban and rural areas. To realize the exchange of people and material between urban and rural areas, priority must be given to the development of transportation. It is necessary to implement a green transportation form dominated by TOD mode. Urbanization leads to the centralized development of cities, while excessive urbanization leads to the single regional ecological structure and the fragile stability of the ecosystem. Through the integration of urban and rural development, regions can achieve the best results with the least material consumption.

4. How should Suzhou integrate into development under the background of Yangtze River Delta integration

4.1 Transportation and information technology speed up development, for integration of support conditions

Suzhou is adjacent to Zhejiang and Shanghai, so its economic activities are naturally influenced by neighboring provinces and cities. In order to narrow the gap with developed areas, Suzhou should take the initiative to open regional

transportation links and establish a platform for fast commuting and information exchange and sharing (Hasan, 2008). By opening the base and platform and introducing technical talents, Suzhou can attract capital investment and build a complete and efficient three-dimensional transportation system.

4.2 Break the isolation of administration and promote the reconstruction of urban division of labor system

With the continuous follow-up of the Yangtze River Delta integration strategy, there will be more and more inter-provincial and inter-regional projects such as greenway interconnection. It is more necessary for all administrative departments to strengthen consultations, improve and unify relevant standards, and promote contact and cooperation in relevant fields. Shanghai should give full play to its leading role, while Jiangsu, Zhejiang and Anhui should give full play to their comparative advantages and strengthen cooperation. Suzhou should vigorously build a modern new city, create new sectors of competitive industries, and create a new highland of openness and innovation. Continue to carry forward the regional advantages of developed manufacturing and rich resources, focus on the development of local competitive industries, and do a good job in regional industrial division (Ryberg-Webster and Kinahan, 2014). Suzhou also needs to implement cross-regional cooperation mechanism, break the restriction of separate administrative boundaries, clarify its development direction, clarify its position and responsibility in the urban division of labor system, and promote the reconstruction of the new urban division of labor system.

4.3 Step up joint efforts to ensure ecological and environmental protection, and promote joint construction and sharing of social service facilities

At present, the environmental problems in the central cities of Yangtze River Delta are not optimistic. In view of the phenomenon that there are different environmental pollution problems in different regions at different levels of development, it is necessary to speed up the research and formulation of unified environmental protection standards and establish cross-administrative environmental remediation teams. We will take special measures tailored to local conditions to improve the environment in areas severely polluted by over-development and straw burning, and actively promote the development of low-carbon city clusters. Suzhou should actively learn from the standards of social service facilities provided by Zhejiang and Shanghai, encourage inter-provincial and city-level higher education cooperation within the region, integrate medical resources within the region, improve equity, and gradually realize consistent rules and equal services.

5. Conclusion

The integration of Yangtze River Delta is an eternal research topic, and regional coordinated development is a major problem facing the world today. Although experts in various fields are committed to the study of this urban development process, the coordinated development of urban agglomeration integration is not a problem that can be solved in a short time. Development problems often reflect the contradictions between cities and urban residents. Only through continuous dynamic planning adjustment, can we minimize a series of negative effects, such as slow development, heavy burden on central city and hollowing out of marginal city, brought about by unbalanced urban development.

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Research on Automatic Control of Central Fresh Air System

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Abstract: In the complex flow of people in large shopping malls and hospitals, in order to ensure the good quality of indoor air, it is very important to supply fresh air indoors. With the popularization of the application of central fresh air system, in order to strengthen the practicability of fresh air system, it is very important to manage the fresh air system through automatic control. This paper expounds the basic control theory of fresh air system and the principle of automatic control of central fresh air system.

Keywords: Central Air Conditioning; Fresh Air; Auto-Control

Introduction

With the continuous growth of China's economy this year and the continuous improvement of the quality of life of Chinese residents, people also put forward higher requirements for buildings and pay more and more attention to the air quality in buildings. In large public buildings such as hospitals and large-scale commerce and trade, the interior of the building has the characteristics of people flow and personnel density. The air quality has a great impact on the internal environment and the use feeling of the building. In the current fresh air system of central air conditioning, most of them adopt automatic control to ensure the effect of internal ventilation and internal air quality. With the acceleration of urbanization in China in recent years, large buildings are emerging, and the automatic control of fresh air system has also developed rapidly [1].

1. Indoor air quality and fresh air volume

1.1 Indoor air quality

In the closed environment of a building, the indoor air will be affected by all aspects of the building. Especially in the air-conditioned room, because the air is an internal circulation mode, it will cause a large number of low concentration pollutants in the indoor air. Affected by these pollutants, most people living in closed buildings will feel stimulated or uncomfortable. In relation to air quality, Danish scientists first put forward the definition of air quality in 1989. However, at this time, the research on air quality is subjective, and the definition of air quality is mostly people's subjective perception of whether the air quality is good. This method has no reference value. After that, in the study of air quality, people analyze the concentration of indoor pollutants and the content of different components in the air, so as to gradually realize the goal of quantifying air quality.

1.2 Standard for fresh air volume of building ventilation

With the development of architecture, in the 1970s, people gradually realized the impact of fresh air on the internal control quality of buildings, which is not only limited to the impact of people's feelings, but also has a negative impact on people's health. With the development of social construction, people are more and more resistant to the building mode at the expense of health and comfort. Under this background, indoor air quality standards have been formulated. Based on this, the European Union puts forward the calculation method of fresh air volume. China has also formulated clear requirements for

this. In the current design of central air conditioning, it is required to meet three basic conditions: first, central air conditioning can dilute the pollutants brought by people's activities. Secondly, the indoor exhaust air volume shall be supplemented to ensure that the indoor is in a positive pressure state. Finally, the indoor fresh air volume shall be greater than 10% of the air supply volume of the system. The specific marking requirements are shown in the table below:

Table 1-1. Indoor air quality standard

Serial number	Reference category	Parameter	Unit	Standard value	Note
1	Physical property	Temperature	℃	22–28	Summer air conditioning
2				16–24	Winter heating
3		Relative humidity	%	40–80	Summer air conditioning
4				30–60	Winter heating
5		Air velocity	m/s	0.3	Summer air conditioning
6				0.2	Winter heating
7	Chemical property	Fresh air volume	$m^3/(h \cdot p)$	30[a]	
8		Sulfur dioxide	mg/m^3	0.5	1h mean value
9		Nitric oxide	mg/m^3	0.24	1h mean value
10		Carbon monoxide	mg/m^3	10	1h mean value
11		Carbon dioxide	%	0.1	Daily mean value
12		Ammonia	mg/m^3	0.2	1h mean value
13		Ozone	mg/m^3	0.16	1h mean value
14		Formaldehyde	mg/m^3	0.1	1h mean value
15		Benzene	mg/m^3	0.11	1h mean value
16		Toluene	mg/m^3	0.2	1h mean value
17		Xylene	mg/m^3	0.2	1h mean value
18		Benzopyrene	ng/m^3	1	Daily mean value
19		Inhalable particulate matter	mg/m^3	0.15	Daily mean value
20		Volatile organic matter	mg/m^3	0.6	8h mean value
21	Biological property	Total colony	cfu/m^3	2500	According to the instrument

2. Principle introduction of central fresh air system

2.1 Composition principle of fresh air system

In the whole fresh air unit, its components mainly include fresh air duct, air supply valve, air supply fan, etc. In the exhaust system, the main components are return air pipe, return air valve, exhaust fan, etc. There are two filter sections in the whole fresh air unit, namely, primary effect filter section and medium effect filter section. Besides the first time, there are hot spots at the fresh air and exhaust air. In the central air-conditioning system, the transmission mode of fresh air generally

adopts the form of replacement. After the external fresh air passes through the initial effect and medium effect, the filtered air is transmitted to the new air outlet, and the fresh air is transmitted to each room through the new air outlet. At the same time, there will also be sealing in each room, which corresponds to the new air outlet, so that the air in the whole room forms a cycle, takes away the indoor waste gas, and allows the indoor air to be replaced regularly to ensure the quality of indoor air. In the spatial layout, the fresh air outlet of the fresh air system is generally arranged at the ceiling, and the exhaust outlet is installed on the floor or lower position of the room to ensure that the indoor air can form a relatively stable flow state after the fresh air enters, so that the dirty air in a room can be discharged through the return air outlet. When cooling or heating the room in summer, the air will be cooled or heated in the fan coil at the exhaust outlet to adjust the indoor temperature. At the same time, in order to achieve the effect of energy saving, the general fresh air and exhaust system will be controlled by frequency conversion to ensure the ventilation effect in each room and reduce the power consumption of the whole system[2].

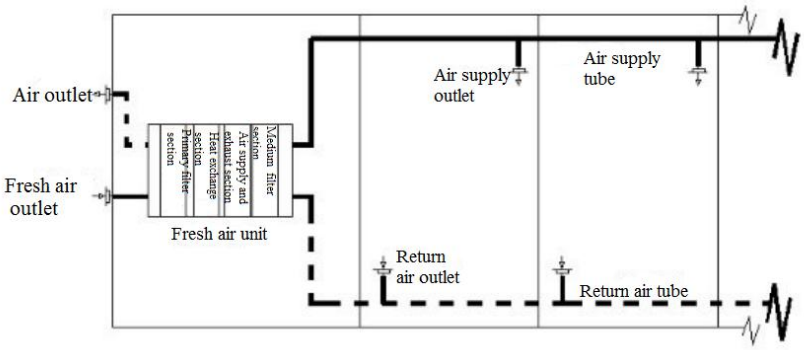

Figure 2-1. Structure diagram of fresh air system.

2.2 Automatic control theory of fresh air system

With the development of computer technology, automatic control system has played a great value in many fields. Under the background that the current building is developing towards intelligence, the control of central air conditioning is also developing towards intelligence. The operation mode of traditional buildings is replaced by intelligent systems, which greatly improves the regulation of office and living environment in buildings and the convenience of people's life. In the automatic control of central air conditioning system, there are many control modes, such as single chip microcomputer (PIC) control, PLC control, analog instrument control and direct digital control (DDC). In the current specific application, analog instrument control mode is less used. At the same time, using DDC and DCS for control also has the problem of excessive fraud. Most of the control through single chip microcomputer will integrate circuits, so there will be the problem of insufficient control function and difficult expansion. In the current air conditioning automatic control, PLC is the most commonly used control mode, and the stability of operation can also be guaranteed.

PLC has the advantage that the program can be written freely, and among the above control modes, this mode has the strongest anti-interference ability. But the problem with this is that the operation speed of PLC is also the slowest. The communication function of PLC is good, and it is very convenient to carry out or expand in the process of use. Therefore, the current automatic control of central air conditioning is the main control method. The specific control composition is shown in the figure below.

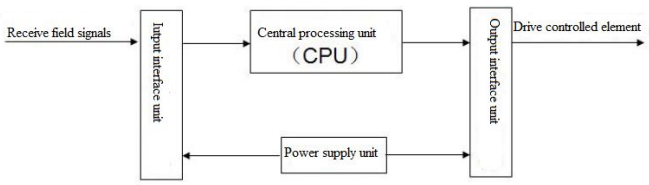

Figure 2-2. Basic composition of PLC.

However, nowadays, the building scale of Suihe building is increasing, and the complexity of the building is also increasing. In some special areas, higher requirements are put forward for air quality. For example, electronic workshop, operating room, etc. Therefore, it puts forward higher requirements for the technical level of automatic control. In order to meet the higher computational requirements of the current central air conditioning system, on the basis of the traditional PLC controller, it will also be combined with computer technology, communication technology and microelectronics technology.

3. Correlation control between indoor pollutants and fresh air volume

In the traditional ventilation control, CO_2 concentration is generally used as the control reference standard. That is, in the calculation of ventilation volume, it will be adjusted and calculated according to CO_2 concentration. When the sensor detects that the CO_2 concentration in the air exceeds the standard, the system will control the fresh air valve and adjust the fresh air fan at the same time, so as to change the input of indoor fresh air. In the initial design, the main reason for taking this as an index is that in people's activities, the most significant index is the CO_2 concentration in the air, so it is regarded as the only standard for air quality identification in the central air conditioning system. However, the concentration of CO_2 in the air cannot be used as the only standard. In the whole building, not only the changes of air quality brought by human activities, but also furniture and decorative materials will bring various air pollutants, which will affect the air quality. The concentration of these organics exceeds the standard, even greater than that of CO_2, and greater harm to human body. Therefore, it is unscientific to take CO_2 concentration as the only standard in control. However, there are many reasons for indoor air pollution, and the concentration of some pollutants is very low. The complex problem of air components makes it impossible to detect all components. After all, which one do you choose? Therefore, in the quality control measurement, air pollutants will be measured according to different scenarios. By combining the grey clustering analysis of different buildings, taking the representative pollutants in different types of buildings as the key reference standard, the correlation control between air pollutants and fresh air volume is established. There are mainly the following different site types [3].

3.1 Underground shopping mall

The underground supermarket has the characteristics of high personnel density and strong mobility. When people pass through underground shopping malls, it will not only increase the concentration of carbon dioxide, but also aggravate the concentration of dust in the air. Underground supermarket shops need to be decorated, so there will be a large number of organic pollutants such as formaldehyde brought by decoration materials. However, with the improvement of the level of urban architecture, it has brought more and more serious space problems, resulting in the continuous improvement of the number and scale of underground shopping malls. Underground shopping malls have the characteristics of high closeness. They can't open windows for ventilation like aboveground buildings. If they don't change air in time, it will inevitably lead to a sharp decline in air quality. However, if the mechanical air supply and exhaust system is adopted, it will bring more energy consumption problems. In order to calculate the grey correlation degree of pollutants affecting air quality in the air, classifying and detecting the pollutants, and correlating the fresh air system are very key. In the relevant gray correlation statistical research, carbon monoxide, carbon dioxide and radon can be classified into one category in the air pollutants of underground shopping malls. Inhalable particulate matter and TVOC can be classified into one category, and organic matter such as formaldehyde can be classified into one category.

3.2 Teaching buildings

In the attention to air quality, teaching buildings and office buildings are the key objects. In order to ensure the practical effect of air conditioning, the early classroom design will adopt a closed design method. Therefore, it will lead to bad smell and poor air quality in the classroom in summer or winter. Classroom is the main activity place for students. Air quality has a great impact on students' study, life and health. According to relevant statistics, students spend more than half of their time in the classroom. Improving classroom air quality is of great practical significance to students' study and life. In the study of gray correlation statistics related to teaching buildings, carbon dioxide, formaldehyde and radon can be classified as one of the air pollutants in classrooms. There is no necessary correlation between carbon monoxide, inhalable particulate

matter and TVOC.

3.3 Office building

The study of indoor pollutants in office buildings is the earliest. The office building has the characteristics of stable personnel and high density. At the same time, there are a large number of electronic equipment and office furniture in the office building, which will have a certain impact on air quality. Combined with the carbon dioxide brought by personnel breathing, the air composition in the office is complex. In the gray correlation statistical study of office buildings, carbon monoxide, formaldehyde and inhalable particulate matter can be classified into one category. Carbon dioxide, microorganisms and sulfur dioxide can be classified into one category. Nitrogen dioxide is classified separately.

4. Conclusion

In the automatic control of the central fresh air system, the detection of the inhalable pollutants in each room, and then the adjustment of fresh air volume after computer calculation are the key to the automatic control of the fresh air system. The key point is to monitor the concentration of pollutants in the air. However, air has the characteristics of complex components. This paper expounds the correlation degree of air pollutants based on different public scenes, and analyzes and studies the whole central fresh air system in combination with the controllable principle of fresh air system, in order to provide reference value for relevant technicians.

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