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Development of Dust Monitoring in Urban Construction Sites and Suggestions on Dust Control

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Abstract: Construction site dust is one of the main sources of urban air pollution. In order to improve urban air quality and reduce the probability of respiratory diseases among construction workers, effective measures must be taken to control construction site dust. Dust monitoring is an important measure to reduce construction pollution to the surrounding environment. Vigorously developing dust monitoring is the only way to build a civilized construction and green city. Improving dust monitoring at urban construction sites has important practical significance for urban air quality control and accurate treatment of dust at construction sites. Dust monitoring can improve the appearance of the city, increase the investment of investors, and promote the economic development of the city. At the same time, it can also increase the living comfort and happiness index of residents, so dust monitoring is very necessary. In this paper, the research status, necessity and development benefits of urban construction site dust monitoring are expounded, then sort out the key points of dust monitoring technology, and give some suggestions to the possible problems in the existing technology to ensure the smooth implementation of dust monitoring. And put forward the proposal with the dust treatment and control from construction unit, construction unit and supervision unit three aspects to help reduce the construction of dust pollution.

Keywords: Construction Site; Dust Monitoring; Governance Control.

1. Introduction

Construction site dust is one of the important causes of urban dust, dust will be generated in every stage of construction. High concentration of dust will cause harm to human body and increase cardiovascular and cerebrovascular diseases and incidence, which is an important hidden danger to the life and safety of construction workers [1]. At the same time, dust from construction sites is also one of the main causes of urban air pollution [2]. Therefore, it is very necessary to control construction dust, and dust monitoring, as an important means of dust control, plays an irreplaceable role in urban construction site dust control [3]. Dust monitoring has a positive contribution to urban economic development and people's living comfort, and is an essential link of urban green development. Through the analysis of the technical points of dust monitoring, this paper can find the problems existing in the practical application, and put forward the corresponding countermeasures and suggestions, so as to ensure the smooth implementation of dust monitoring in urban construction sites.

2. Research Status of Dust Monitoring at Urban Construction Sites

Since the Ministry of Housing and Urban-Rural Development promulgated the special work plan for the control of construction dust at construction sites in 2017, significant achievements have been made in the control of construction dust across the country [4]. The construction unit can prevent dust by hardening the road in and out of the site, covering the bare place and sprinkling water. With the research of dust control, dust monitoring also attracts people's attention. He T Z [5] et al, proposed a remote monitoring method of construction dust pollution based on GPRS, extracted feature values of monitoring images, and classified monitoring images by Naive Bayes classifier, so as to realize remote monitoring and recognition of construction dust pollution. The experiment showed that the remote monitoring effect of the proposed method was good. Sun B [6] et al, combined a variety of advanced technologies to complete the urban dust online monitoring system, and transmitted the monitoring data TSP, PM10, PM2.5, temperature and humidity, wind speed and direction, and location to the monitoring platform in real time, so as to realize the continuous online monitoring of urban dust distribution. Sun Y X [7] et al, built a monitoring system composed of equipment monitoring layer, data transmission layer and cloud service platform to monitor dust concentration and noise decibel at the construction site in real time, thus improving work efficiency and prevention effect. Ding C J[8] et al, designed a LORA-based dust monitoring system for Internet of Things building construction sites. The three-layer architecture of the Internet of Things was used to collect, upload and process data, realizing the function of real-time monitoring of dust in the construction process and alarm for abnormal conditions. Huang T J [9]et al, monitored the dust mass concentration in different areas inside the site during the earthwork construction stage, and the results showed that the dust mass concentration and over-standard rate in the cement processing area and on both sides of the road were significantly higher than those in other areas, which had a great impact on relevant construction personnel. Fang Fang [10] et al, compared the manual monitoring with the online monitoring equipment, and concluded that the manual monitoring method was reliable, the monitoring data was authentic and credible, and had a good correlation with the online data, which provided a technical basis for the government to enforce the law on the online monitoring data of dust, and played a guiding role. Urban dust monitoring is of great significance for the prevention and control of air pollution and the reduction of respiratory diseases

[11][12].With the deepening of the concept of green site, the requirements of the construction site are becoming more and more strict, and the civilized construction such as dust monitoring and control, noise control, and site environment has been paid more and more attention. In many studies, although the current urban dust monitoring has been greatly developed, there are still some problems such as insufficient monitoring in some places and delayed transmission of monitoring data. The reason is that some construction units do not monitor according to the requirements, or the introduced monitoring system technology development is limited.

3. The Necessity of Dust Monitoring at Urban Construction Sites

The construction of dust monitoring on urban construction sites is an important part of strengthening urban management, and also an important part of urban pollution prevention and green construction. It is an effective way to promote the efficient and orderly development of urban management and improve the modernization level of urban governance system and governance capacity.

3.1. Important Measures to Build a Modern Social Governance System

The construction of dust monitoring platform in urban construction site is an effective means to promote the new mode of urban governance. The construction of construction site dust monitoring platform will effectively promote the interconnection and open sharing of data resources among multiple departments, promote information services and public participation in urban management, and improve the level of urban governance and service modernization.

3.2. The Inevitable Choice of High-Quality Urban Development

It is an effective means to comprehensively improve urban governance and service level. It is an effective means and an inevitable choice to carry out special urban governance, and to build ecological livable and quality of life.

3.3. An Important Part of Green Site Construction

Dust monitoring at urban construction sites is an important measure to improve the management efficiency and service level of urban pollution prevention and control, and an important part of green construction sites. Through the integration of monitoring systems and other resources, the management of urban air quality, noise and light pollution can be realized to promote urban green development [13].

4. Urban Construction Site Dust Monitoring Development Benefits

4.1. Economic Benefits

Create a good investment environment for enterprises: Construction site dust monitoring can promote urban cleanliness, improve the overall competitiveness of the city, improve the city's comprehensive environment, enhance the ability to attract investment. At the same time, it can accelerate the pace of economic construction and play a positive and effective driving role.

Introduction of high-paying talents in high-tech enterprises: Through the construction of urban construction site dust monitoring platform, the leading role of major projects will be played, well-known experts and scholars in the industry will be attracted to participate in the research, and the Internet of Things technology and management talents will be introduced to actively create various conditions and encourage candidates to actively participate in the practice of urban comprehensive management.

4.2. Social Benefits

Improving the quality of life services: the city construction site dust monitoring platform, to effectively curb the construction dust impact on urban air quality, significantly reduce the heavy pollution days, obviously improve ambient air quality and significantly improve the people's well-being, the blue sky for the masses to create a more harmonious and comfortable life and living environment.

To realize the scientific transformation of urban management: the construction of the urban construction site dust monitoring platform can supervise and dispatch the urban construction site dust pollution at all times, changing the previous passive management. It marks that the law enforcement and disposal of urban management has realized the transformation from passive to active, from post to advance, and from surprise to normal, realizing the scientific, standardized and refined urban management [14].

5. Analysis of Key Points of Dust Monitoring Technology at Urban Construction Sites

5.1. Analysis of Key Technical Points

The technologies involved in urban construction site dust monitoring include cloud computing, Internet of things, big data and other current mainstream information technologies, which have experienced a large number of applications in practice, but still have certain technical complexity and difficulty, mainly reflected in: (1) For the business model and business needs of dust monitoring management, although there are related products in the market, they must be developed for the application needs to meet the requirements, which puts forward higher requirements for developers. If the industry is not deep understanding or development strength is not strong, it is easy to lead to the implementation of the project cannot achieve the expected effect; (2) The project involves many software modules, involving a large number of business systems, external system interface and data exchange, the system integration has high requirements, if some software modules integration is not good or not ideal, may affect the use of monitoring system effect.

5.2. Key Technical Countermeasures

(1) Strengthen demand analysis, hire professional consulting agencies to assist in demand analysis when necessary, clarify requirements from the business level, optimize the process, and prepare for software development;

(2) Strengthen the design, fully consider the integration relationship between each module during the design, draw clear functional boundaries of each module, and clarify the application interaction mode and data content. The detailed design ensures that various problems and possibilities are fully considered before the development, which provides a basis for the subsequent implementation.

(3) Do a good job in software selection. On the basis of

clear design, carefully select software products, giving priority to software products with high integration degree, good openness and high functional satisfaction. Clarify integration tasks with suppliers before purchasing, achieve integration commitments and ensure no problems in integration.

(4) Make a good implementation plan, implement many interfaces by stages and steps according to the overall implementation plan, and implement those interfaces that must be integrated at present; The next most urgent is to implement it later;

(5) Strengthen the test, in accordance with the designed interface implementation, to organize a large number of integration tests, including functional integration, data integration and performance pressure testing, in order to make a good evaluation of the overall integration of the system, reduce the bugs in the process of operation;

(6) to strengthen the organization, do a good job in integration requires all parties to be integrated with integrators coordination, good coordination, to do a good job in the integration in the critical period of integrated development testing, need to be led integrators, combined the technology of the integration of party personnel together a special team, together to solve problems, to guarantee the timely feedback and solve the problem.

6. Suggestions on Dust Control at Urban Construction Sites

In order to further improve the urban air quality and people's living environment and improve the urban management level, it is necessary to strengthen the monitoring and control of dust at construction sites. Measures can be formulated from the three aspects of construction units, construction units and supervision units [15].

6.1. Suggestions on Dust Control in Construction Units

(1) Specify the dust control requirements of the contract

The construction unit shall specify the dust control measures on the construction site before bidding and write them into the bidding documents. The construction unit shall explain the relevant dust control requirements during the bidding, and the requirements in the bidding documents must be met during the construction. When the construction unit signs the contract with the construction unit, the responsibilities of both parties in dust control should be clarified, and the cost of dust control should be clarified. For violations of the contract, the construction unit has the right to require the construction unit to carry out dust control according to the contract. If the construction unit continues to fail to perform its duties, the construction unit has the right to arrange other personnel to enter the site for dust control.

(2) Strengthen dust control fund management

When the construction unit pays for civilized construction measures, the construction unit is required to report the dust control measures, the completion of each measure and the cost. The construction unit shall review the measures reported by the construction unit to see whether they are in accordance with the site, and pay the dust control cost according to the contract unit price and the actual completion of the site.

6.2. Suggestions on Dust Control of Construction Units

(1) Strengthen the construction site management system

The responsibility system for dust control shall be established, and the construction unit shall establish the guarantee system for dust control funds, materials and personnel. The special plan for dust control shall be prepared and approved in time, and the construction unit shall implement it according to the approved special plan. Carry out the assessment of dust control responsibility target, assess the construction unit according to the assessment system, and punish the construction unit according to the assessment. The effect of site dust control is linked to performance pay and bonus, and the site management personnel are encouraged to actively exercise the dust raising measures, so that a sense of dust raising management is formed from the top down.

(2) Phased control

Construction site dust is inevitable, construction units can be divided into different stages of the site dust control. In the stage of foundation construction, enclosed enclosure shall be set. The entrance and exit roads must be hardened, and the rest of the roads and passages within the field shall be covered with hardened or hard materials. In the earth excavation area, wet operation method and sprinkling water should be used to remove dust. Water pressure dust should also be sprinkled around the foundation pit. The bare soil that can not be transported and the bare soil in the non-working area should be covered in time, and the water should be sprayed to wet on time. The main construction stage, focusing on multi-angle, multi-level spray. When transporting slag and construction materials, vehicles shall not drag soil onto the road, which may cause dust pollution on urban roads; In the stage of main body improvement, PM10 automatic monitoring device is continued to be used to sprinkle water pressure dust in the outdoor auxiliary engineering operation area. Construction materials cover or bagged treatment, construction waste timely clearance.

6.3. Suggestions on Dust Control of Supervision Unit

(1) Strengthen the supervision of construction units

As the department entrusted by the owner to supervise and manage the whole process of the main construction, the supervision unit can audit the quality, progress, civilized construction and other aspects of the construction project, so it should also play a management role in the dust control of the construction site. The supervision unit shall strictly examine whether the dust control measures reported by the construction unit meet the requirements of the contract and relevant policies, and order rectification of the measures that do not meet the relevant dust control, and the serious ones can be stopped. In short, to the construction site dust control to undertake a comprehensive and strict review.

(2) Improve the review and reporting mechanism

The supervision department should report the inspection results of dust control on the construction site to the construction unit in time, and explain the measures taken by the construction unit in dust control, whether it meets the expected effect, and what deficiencies there are. Construction units and environmental supervision departments can obtain the most cutting-edge information about dust control at the construction site from the supervision units. Construction units should fully cooperate with the supervision and

inspection, and actively rectify measures that do not conform to dust control.

7. Conclusion

To sum up, dust monitoring at urban construction sites is very necessary, is an important way to prevent and control urban air pollution, and is also an important part of civilized construction. Good monitoring and control of dust on urban construction sites can not only bring economic benefits to the city, but also provide a more comfortable environment for urban residents. With the development of technology, dust monitoring has made new breakthroughs, which can meet the increasing needs of civilized construction, and is an indispensable part of reducing construction pollution.

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