DOI: 10.53469/jtpms.2023.03(10).04

Analysis on Construction Technology and Quality Control of Asphalt Pavement in Highway Engineering

Yanfeng Wang

Graduate School of Business, Graduate University of Mongolia, Ulaanbaatar, 11000, Mongolia

Abstract: ***With the development of the times and the progress of society, people's requirements for quality of life have become increasingly high. The number of private cars has increased, and road construction projects have also continued to increase. Asphalt pavement has been widely used in road engineering due to its advantages such as high durability, convenient material extraction, and road smoothness. However, the complexity of asphalt pavement construction has brought many difficulties to the construction unit. Strict control over the construction technology and quality of asphalt pavement can not only ensure the normal operation of construction, but also reduce costs. This article focuses on the construction technology and related quality control measures of highway asphalt pavement.***

Keywords: asphalt pavement; Construction technology; Quality control measures.

1. INTRODUCTION

In recent years, domestic high-grade highway projects have mostly adopted asphalt pavement, which has waterproof characteristics and can effectively prevent corrosion. This type of pavement is relatively flat, convenient for maintenance and operation, and has a high degree of safety. [1] Considering the close relationship between asphalt pavement operation technology and highway quality, it is necessary to reasonably select pavement construction technology, strengthen quality control work, fully ensure the effectiveness of asphalt pavement operation, and extend the service life of the highway.

The term "perspective" originated from the perspective technique discovered by artists in the 15th century, and was later extended to the "perspective of viewing problems" in literature. In the field of literature, the most representative definition of "children's perspective" is to use children's eyes or tone to tell a story. The presentation process of the story has distinct characteristics of children's thinking, the tone, posture, psychological and value standards of the work, as well as the structure, aesthetic and consciousness factors of the text, All are subject to the narrative perspective of the child chosen by the author[1-6].

In recent years, with the promotion of theoretical practices such as the Children's Rights Movement, New Childhood Sociology, and Reggio Education Practice, the status of children in research has begun to improve. The advocacy of children's rights has led researchers to pay more attention to children themselves, and the perspective of children has become an important educational perspective after the social perspective. The exploration of children's perspectives first appeared in sociological studies related to children conducted by Nordic scholars in the 1970s and 1980s. However, the first formal definition and systematic exposition of a child's perspective was by Swedish researcher Sommer. D in his book "Children's Perspectives and Children's Perspectives in Theory and Practice", who defined the child's perspective as the child's own perception and experience of the world as the subject, which is the meaning construction of children's individualization and dynamic development, It is the phenomenology of children themselves. At the same time, he and other authors of the book delved into the theoretical background of children's perspectives and their application in the curriculum and teaching of preschool education[7-10].

In 2004, the "Young Childrens Perspectives" special interest group under the European Society for Preschool Education was dedicated to studying the perspectives and rights of children under the age of 8. Early research on children's perspective is more targeted at children in primary schools or older children. In order to study the perspective of young children, the seminar "Look Who's Talking: Elicing The Voice Of Children From Birth to seven" held by Strathclyde University in Sugra in 2017 attracted researchers from various universities to participate in the speech, Make the current research status of "children's perspective" more comprehensive. It also makes research more systematic and actionable.

Many domestic scholars have also explored the "perspective of children", Yu Xiang (2014) believes that "the perspective of children refers to the ability of adults to stand in the position of children, consider their thoughts, respect them, and protect their rights when it comes to their thinking and actions." Modi summarized the perspective of children as follows: "The perspective of children should focus on listening to their own voices and paying attention to their own realistic attitudes. In the research process, respect and satisfy children.

In summary, different scholars at home and abroad have attempted to define the "perspective of children", focusing on dimensions such as "listening to children", "respecting children", "children of different ages", and "children's participation". As research deepens, the subject of children's perspective gradually shifts from "research on children" to "research with children", which greatly enhances children's participation.

2. THE MOST COMMON PROBLEMS WITH ASPHALT PAVEMENT ON HIGHWAYS

In modern society, the number of mechanical vehicles driving on the road surface has significantly increased compared to before, and the pressure on the road surface has significantly increased. These all increase the probability of road surface fracture, which is directly related to the aging and severe quality damage of asphalt materials on the road surface. From the perspective of performance characteristics, road surface fractures are initially caused by ruts, small cracks, etc. These problems need to be discovered and addressed in a timely manner. If these problems cannot be effectively addressed, it is easy to make the crack problem more serious, ultimately leading to direct road surface cracking [2]. If the quality and performance of the asphalt material itself cannot meet the requirements of national and industry standards, and it is prone to quality damage under continuous traffic compaction, which can lead to varying degrees of damage to the pavement surface and base layer, ultimately leading to fracture conditions. So, in order to effectively ensure the basic quality of asphalt pavement, on the one hand, it is necessary to strictly implement construction technical measures, and on the other hand, it is also necessary to ensure that the raw materials meet the requirements of the specifications.

2.1 There is no accurate concept of size for the spatial scale, and the three- dimensional spatial design and spatial scale prediction are not quite accurate

For example, students may have designed a 2-meter diameter chair for a 30m² storefront, and only 0.3 meters for the porch of the door. The design of the stair step width is too narrow. The reason is that students lack their spatial thinking exercise and their basic spatial perception ability is weak. For example, students cannot distinguish between plane, facade, ceiling and ceiling view, nor can they understand the relationship between three-dimensional space and face view. This needs to be carefully described and correctly guided, otherwise the subsequent courses will be difficult to progress, let alone innovative. For example, students have no concept of the size of the spatial scale, can not distinguish between one meter and three meters, or the spatial difference between one meter high solid wall and 0.5 meters of solid wall, or the different height of solid wall give people different space feelings and so on. If you can let the physical object, training base, VR virtual simulation base to participate in, nature is very good. However, without these devices, how to make students feel the space easily and intuitively, and use the three-dimensional space model to simulate the real space is still very effective. In particular, to explain the complex space, and to understand the relationship between the space. When students understand the three-dimensional space, if they have the model assistance, they can play with the space and clear the real state of the space, which will help students to verify the advantages and disadvantages of their design works. The design works are originally the best choice after selection, comparison and repeated "exercises". When making various comparisons and space adjustments, if there is a real-time intervention of three-dimensional space software, it will inevitably make the design more understandable and simple, which plays an important role in guiding and improving the subsequent growth of students.

2.2 The design progress is difficult and has low efficiency

Due to the lack of students' three-dimensional spatial scale, the design progress is repeated, changed back and forth, and there is no goal and direction, often confused and unable to start, which is not conducive to students to improve their design ability, let alone innovation ability. Even after the three-year course, the number of students has not made any improvement in space design. In view of this, we advocate the use of three-dimensional space resource database, to optimize the curriculum system according to students' cognitive level, talent training objectives, and enterprise job needs, and to integrate three-dimensional space resources into the course in a granular way. Take

the course "Commercial Display Space Design" as an example, whether in the process of course design, teaching and explanation, or task layout, in the process of case explanation, there are different degrees of three-dimensional space resources integrated. The following is an experimental exploration of how to improve students' innovation ability through three-dimensional space resources in the course of "Business Exhibition Space Design" of environmental art design major in higher vocational colleges.

2.3 Promoting Critical Thinking

Interdisciplinary thinking promotes critical thinking by challenging individuals to analyze, evaluate, and synthesize information from various disciplines. It encourages individuals to question assumptions, consider different perspectives, and develop a more nuanced understanding of complex topics.

2.4 Enhancing Problem-Solving Skills

Interdisciplinary thinking equips individuals with a broader range of tools and approaches to problem-solving. By drawing on diverse knowledge and methods, individuals can develop more effective strategies for addressing complex problems and making informed decisions.

2.5 Encouraging Collaboration and Communication

Interdisciplinary thinking often requires collaboration and communication between individuals from different disciplines. It fosters teamwork, cooperation, and the exchange of ideas, leading to a more inclusive and diverse learning and working environment.

2.6 Addressing Real-World Challenges

Many real-world challenges, such as climate change, public health crises, and social inequality, require interdisciplinary approaches for effective solutions. Interdisciplinary thinking enables individuals to understand the interconnected nature of these challenges and develop comprehensive strategies that consider multiple factors and perspectives.

2.7 Lifelong Learning

Interdisciplinary thinking promotes a lifelong learning mindset by encouraging individuals to continuously seek out new knowledge and perspectives from different disciplines. It helps individuals develop a curiosity for learning and a willingness to explore diverse areas of knowledge throughout their lives. In summary, interdisciplinary thinking is important because it allows for a more comprehensive understanding of complex issues, fosters creativity and innovation, promotes critical thinking and problem-solving skills, encourages collaboration and communication, addresses real-world challenges, and cultivates a lifelong learning mindset. By embracing interdisciplinary thinking, individuals can navigate the complexities of the modern world and contribute to meaningful and impactful solutions.

3. CONSTRUCTION PREPARATION STAGE

The integrated talent cultivation mode of secondary and higher vocational education is an important part of the construction of modern vocational education system. In response to the problems of poor connection between secondary and higher vocational education, as well as poor effectiveness of on - the - job internships in the sixth semester of secondary and higher vocational education, the "3+2" segmented cultivation mode of secondary and higher vocational education has been implemented, Yongjia College of Wenzhou Polytechnic actively innovates and practices, formulates a "1+3+1" talent cultivation plan and curriculum system for the integration of secondary and higher vocational education in valve design and manufacturing, and builds an integrated practical teaching platform for secondary and higher vocational education. Practice has proven that talent cultivation has achieved good results.

3.1 Make relevant preparations before construction

There are many factors that affect the paving technology of asphalt pavement on highways. The different locations of highway engineering areas will affect the performance parameters and actual requirements of asphalt paving

technology. Frontline construction technicians need to have a comprehensive understanding of the area where the highway is located, in order to ensure that the construction technology plan meets the basic requirements of the construction site. Based on the understanding of the frontline survey, construction technicians need to choose suitable materials and equipment and proactively contact the material design team.

Supply enterprises should prepare and scientifically plan transportation routes in order to lay the foundation for the storage of subsequent materials. At the construction site, it is necessary to prepare equipment for acceptance in advance, so that different projects and elements can be comprehensively and effectively inspected and managed. The person in charge of the construction project also needs to organize technical personnel, provide technical disclosure on construction technology, and provide corresponding education and training on quality and safety to ensure that the quality level of frontline technical personnel meets the requirements.

3.2 Asphalt mixture ratio design and transportation

The construction of asphalt pavement paving on highways is very complex and requires good preparation work. There are many factors that can affect the quality of the paving materials. The actual production and transportation of the paving mixture will have an impact on the quality and performance of the paving materials. Frontline construction technicians need to grasp the mix proportion according to standard requirements, prepare various component materials, and implement mixing and other work after completing the mixing, Make the mixture more uniform [3]. For materials mixed according to standard requirements, performance testing is also indispensable before specific application. Only when there are no waiting materials during testing can they be transported to the construction site according to the established plan. During the entire process of asphalt mixture mixing and transportation, sufficient attention needs to be paid to temperature control, usually covering, in order to ensure that the performance of the asphalt mixture is not affected.

3.3 Do a good job in equipment management

During the construction process, to ensure the performance of construction equipment, regular maintenance should be carried out on the equipment in daily life. The construction unit should implement equipment management from multiple perspectives and strengthen the supervision and maintenance of equipment. Firstly, pre job training should be conducted before construction to ensure that construction personnel can operate the equipment according to the user manual, supervise the construction process, and promptly identify any problems in the use of the equipment. Secondly, regular management and maintenance work should be carried out, such as regularly adding lubricating oil to the equipment and checking for any abnormal noise issues during operation. Thirdly, for newly purchased large-scale construction and testing equipment, in addition to requiring relevant technical personnel to operate according to the instructions, it is also necessary to supervise the construction equipment and establish a dedicated responsibility system.

Establish a corresponding technical team responsible for the maintenance, cleaning, and repair of construction equipment. Fourthly, for construction equipment such as large compactors, crushers, and demolition machines, it is necessary to keep records of construction consumption, determine maintenance plans based on construction intensity, and improve maintenance quality. After completing a specific asphalt pavement laying task, relevant equipment used should be inspected and repaired. For equipment that is difficult to complete the construction task and has quality problems beyond the age limit, high-strength construction equipment should be replaced in a timely manner. In addition, frontline construction personnel should contact the finance and management departments, report the usage and consumption of equipment on time, and solve problems in equipment use and maintenance.

4. ASPHALT PAVING CONSTRUCTION TECHNOLOGY IN HIGHWAY PAVEMENT CONSTRUCTION

4.1 Reasonable selection of materials and equipment

To ensure the construction quality of asphalt pavement, in addition to ensuring the technical level of the project and the professional level of construction personnel, the most important thing is the selection of materials and equipment. The use of appropriate materials is crucial for building high-quality pavement projects. Therefore, before construction, it is necessary to conduct a systematic inspection of all materials required for the project, and determine whether the quality of the materials is qualified based on the inspection results. First, in the process of material handover, professional quality inspectors shall conduct inspection to ensure that there are no problems in

the quality and quantity of materials before signing the purchase contract to ensure the scientific management of raw materials. Secondly, in terms of subsequent material storage, it is necessary to strictly follow the requirements in the manual. Before materials that have been stored for a long time are taken out for use again, professional quality inspectors need to evaluate the materials to see if they are suitable for continued use in order to ensure the safety of the materials. Expired materials cannot be used during construction to prevent asphalt Roadworks construction problems caused by unqualified raw materials. Third, the construction unit should establish a process management mechanism from the purchase of construction raw materials, the preservation of construction materials to the use of construction materials. In addition to the purchase of asphalt Roadworks construction raw materials with quality and quantity guaranteed, it should also select raw material suppliers according to the construction requirements of different roads and the changes in market material costs, establish a complete raw material supply chain, and strive to eliminate the lack of raw material supply Unreasonable supervision process of raw material quality and other issues. In response to the requirements of asphalt pavement laying, a management mechanism that integrates supervision, testing, and quality verification should be established to strengthen the management of asphalt pavement road quality.

4.2 Paving construction technology

After completing the paving operation, the road surface should be flat and dense, and the actual friction coefficient of the road surface should also be appropriate to ensure that passengers in the vehicle feel comfortable. To ensure the achievement of this goal, construction personnel need to effectively control the basic speed of the paver and the standard thickness of the paving. Among the key control parameters, the paving width and cutting amount also need to be given sufficient attention. With the increasing number of modern high-grade highways, especially in the face of multi lane highways, it is necessary to choose two or more pavers. Machine co operation. In the selection of pavers, it is necessary to strictly grasp the performance indicators and operating parameters, and the spacing between different pavers needs to be controlled within the range of 0.2m. Some special positions or corners are difficult to pave with a paver, which requires manual handling to meet the basic requirements of road paving operations, ensure uniformity and integrity of paving, and avoid possible joints in the middle of the road. Timely handling of discovered problems during paving operations also helps to ensure the basic quality of highway construction.

4.3 Rolling construction technology

In road paving operations, rolling plays the most important role. Strict rolling operations can compress the internal space of the paved asphalt mixture to the maximum extent, thereby minimizing the porosity of the road surface and gradually improving the compactness. In order to ensure the effectiveness of compaction, it is necessary to strictly select the model of the compactor and effectively adjust its performance parameters to meet the actual requirements of compaction speed and strength. The number of compaction times needs to be determined based on the performance of the test section compaction. If compaction is excessive or not in place, it will affect the basic quality of the road surface, and it is easy to fail to meet the acceptance standards. When carrying out rolling operations, it is common to encounter the situation of cellars, which requires construction personnel to choose manual repair methods to ensure that the road surface is sufficiently flat and smooth.

5. TECHNICAL CONTROL STRATEGIES DURING ROAD PAVING PROCESS

5.1 Control the temperature of mixture paving

In actual paving operations, frontline construction management personnel must take reasonable control measures to meet the needs of high-quality paving. Firstly, it is necessary to control the distance between the vehicle used for transporting the mixture and the paver in order to ensure that the paver is always in normal operation and can meet the standard requirements for effective material reception. During the paving operation, it is necessary to strictly control the temperature of the mixture to ensure that the temperature is always controllable. The different environments will have varying degrees of impact on the temperature of the mixture. If the ambient temperature is relatively low, it is necessary to control the paving temperature between 150~165 ℃. If the temperature is too low, it cannot meet the actual requirements of normal paving, and the paving operation needs to be carried out at other time periods. If the environment is normal, it is necessary to strictly control the paving temperature, which generally cannot exceed 150 ℃, but it is also necessary to ensure that it is not lower than 135 ℃. In determining the paving temperature, it is necessary to combine it with the local environmental climate. Different environmental

temperatures can also affect the viscosity of asphalt and the actual thickness of paving. In order to improve the basic quality of road paving operations, frontline construction technicians need to fully refer to various data information in the construction area when determining the optimal paving temperature.

5.2 Pay attention to the acceptance work of asphalt mixture paving quality

For the paving work of asphalt pavement mixtures, acceptance work plays a very important inspection role, which can accurately grasp whether the paving operation meets the requirements. Meeting the standard requirements is of great significance for the completion of paving projects. Frontline supervision personnel need to strictly check the quality of paving, participate in all aspects, and inspect every technical application. In actual inspection, it is important to focus on the loose paving thickness, flatness, etc. When checking the loose paving thickness, it is necessary to pay attention to the loose paving coefficient. The product of this parameter and the design layer thickness is the standard thickness value of the mixture paving. We should pay attention to the paving thickness of the road surface and focus on the control of road arches. In order to ensure the overall compactness and flatness of the road surface, it is necessary to ensure the continuity of the paving operation and the continuous and even mixture. These require the paving operators to strictly grasp the paving output and actual speed, and effectively meet the construction standards.

5.3 By doing a good job in quality inspection and evaluation, the quality of materials and the effectiveness of construction can be seen very intuitively

The construction unit shall establish a sound quality detection and evaluation mechanism, strengthen the comprehensive management of asphalt Roadworks construction activities, and do a good job in quality management, material management, construction process management, etc. Firstly, in response to the characteristics of long-term construction and multi team construction of asphalt pavement, it is necessary to carry out quality testing and evaluation of asphalt pavement. In addition to testing the road bearing capacity and paving conditions, it is also necessary to test the transportation characteristics of asphalt pavement under extreme weather conditions, and conduct professional evaluations of the drainage capacity, high and low temperature resistance, and ductility of asphalt pavement, Ensure that the paved asphalt road can meet the subsequent construction requirements. For the relevant links where problems arise, the construction team and management personnel should be held accountable. Secondly, establish a sound construction inspection and management mechanism, and strengthen quality inspection. Linkage between groups. The quality evaluation of asphalt pavement should be carried out in an open and fair manner. In addition to the construction unit, the supervisor, central laboratory, and owner unit should also participate in the quality control work of asphalt pavement to ensure the scientific nature of quality inspection work. Third, timely summarize the quality control experience of Roadworks, sort out the basic skills of asphalt Roadworks, record and summarize the reasons for the problems that have occurred but do not affect the basic transportation function of asphalt pavement, and provide necessary reference experience for the subsequent construction and maintenance of asphalt pavement.

6. SUMMARY

Prepare for construction such as material and mechanical facility inspection, setting out, and grassroots disposal, carry out mixing and transportation of mixtures, paving and rolling of mixtures, prevention and treatment of road surface cracks, measurement and inspection of road grooves, and construction techniques such as paving and compaction, fully solve the problem of road surface cracks and ensure that the compaction level meets the standard. To actively implement quality management measures, in terms of materials, paving smoothness, mechanical facilities Effective control is implemented in various aspects such as road maintenance to improve the overall construction quality of asphalt pavement.

REFERENCES

[1] Bi Cong Research on the Performance Evaluation and Maintenance Measures of Expressway Asphalt Pavement [J] Transportation World, 2021, 28 (1): 116-117
[2] Fan Juan. Application of SBS modified asphalt mixture in highway pavement maintenance and expansion projects [J] China Highway, 2021, 28 (2): 108-109
[3] Tang Hongsheng Discussion on Construction Technology of Expressway Asphalt Concrete Pavement[J] Architecture and Decoration, 2021, 26 (1): 118124

[4] K.N. Lin: Introduction to Relevance Translation Theory, Chinese Translation Journal,
[5] (1994)No.4, p.8-11.
[6] Y.C. Zhao: The explanatory power of relevance theory on translation, Mordern Foreign Languages, (1999)No.3, p.276-295.
[7] D.F. Wang: Cultural Default and Coherence Reconstruction in Translation, Journal of Foreign languages, (1997)No.6,p.56-61.
[8] D.F. Wang: Cultural Default and Translation Compensation (China Foreign Publishing and Translation Company, China 2003).
[9] X.J. Li: Cultural Default and Translation Strategies from the Perspective of Relevance Thoery, Foreign Language and Literature, Vol. 29(2013) No.3,p.112-116.
[10] D.L. Wu and J.H. Wu: Scope of Applicability and reconstruction of Relevance of the Relevance of Translation Theory, Journal of Guangxi University for Nationalities (Philosophy and Social Sciences Edition), Vol. 39(2017) No.4,p.185-190.
[11] Sperber, D. And D. Wilson: Relevance: Communication and Cognition(Blackwell, America 1986).