



Optical Fiber Communication Engineering Design Optical Fiber Line Construction Technology

Xingping Dong

Wuhan Huaxia Institute of Technology Wuhan 430223, Hubei, China.

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***Corresponding author:** Xingping Dong, Wuhan Huaxia Institute of Technology Wuhan 430223, Hubei, China.

Abstract

With the rapid development of modern technology and information means, the demand for Internet communication is increasing, which also makes optical fiber communication engineering got more and more attention, and in the actual construction of optical fiber communication engineering, optical cable line design as a crucial content, to the final signal transmission quality and receiving quality, therefore, need to further improve the cable line construction technology research, in order to ensure the overall construction quality of optical fiber communication engineering. Therefore, the paper first clarifies the construction technology of optical fiber communication engineering, then analyzes the key points of the construction technology, and proposes the attention of the construction technology.

Keywords

Optical fiber communication engineering; Optical cable line; Construction technology

The design and construction of fiber-optic cables is a crucial aspect of fiber-optic communication technology, directly impacting the overall performance of the communication. To ensure the proper functioning of fiber-optic communications, it's crucial to identify the key features, technical requirements, and key issues to consider, and implement appropriate technical measures to ensure optimal performance. Furthermore, fiber-optic networks can provide more information, increase data transmission speeds, and better address information delivery issues for both users and companies.

1. Construction Technology of Optical Fiber Cable

In optical fiber transmission, to better ensure the reliability and security of optical fiber transmission, it is necessary to improve the performance and quality of optical fiber transmission throughout the entire optical fiber transmission project. In the past, optical fiber communication technology has always been based on optical fiber communication. Its technical characteristics have enabled it to be widely used in the Internet, television, and other fields, providing great convenience to people's lives.

1.1 Fiber Optic Cable Laying

In fiber optic communication technology, laying optical cables is the first and most critical step of the entire project. Nowadays, people's requirements for communication are getting higher and higher, so a complete plan must be formulated and carried out by specialized experts to reduce some troubles. Generally, the main tasks of fiber optic cable laying projects are: first, before the formal construction, relevant work must be carried out, such as the required tools and machines; secondly, when implementing the project, full consideration should be given to the surrounding environment to ensure the harmony of temperature and the surrounding environment, so that the subsequent project

can proceed smoothly and improve the quality of cable laying; in addition, according to the different types of optical fibers, corresponding installation and fixing work should be done well, and its main construction procedures and procedures should be clarified to ensure the smooth construction of the fiber optic cable.

1.2 Quality Inspection of Fiber Optic Cables

When conducting quality inspection on optical fiber cables, we should focus on the following: First, we should inspect the appearance of the optical fiber cables to check whether there are any damage, aging and other problems on the surface; secondly, we should inspect the quality of the interior of the optical fiber cables. By conducting a comprehensive inspection on the interior of the optical fiber cables, we can determine whether the performance of the optical fiber cables meets the requirements of optical fiber technology; finally, we should test the overall characteristics of the optical cable, focusing on the transmission stability and transmission rate of the optical cable. These two indicators can be achieved through real-time data transmission, which are achieved by the insertion loss of the optical fiber line, the transmission capacity of the optical cable, the optical cable line loss, etc.

1.3 Testing of Optical Fiber Cables

In optical fiber communication technology, the basic laying work of optical fiber cables has been completed. The next step is to start measuring immediately, using the radiation characteristics of the north line to detect the condition of the optical fiber joints and ensure the working condition of the optical fiber cable. In addition, the damage and decay of the optical fiber cable must be made clearer. Once a problem occurs, it must be replaced accordingly. During the entire test process, the data of the optical time domain reflectometer must be accurately recorded, otherwise it will affect the subsequent detection work; secondly, in the compilation of traditional data, attention should also be paid to the processing of other data. If the difference between the light length inside the optical fiber and the length of the optical fiber is required, a specific residual length must be obtained; in the entire pulse width, the length pulse width is a very critical factor. It can expand the dynamic range, stably improve the resolution, and obtain better use results, thereby further adapting to the requirements of data and information (Qi, 2021).

1.4 Acceptance Period of Fiber Optic Cables

Final acceptance of fiber optic cables is the final step in the entire fiber optic communication technology process and a crucial factor in determining the quality of the entire project. During the acceptance period, the construction company must submit the relevant documents and materials to the relevant completion acceptance agency. Furthermore, the acceptance process must adhere to the basic principles of fairness, impartiality, and openness.

2. Problems Encountered in Optical Fiber and Cable Construction

2.1 Insufficient Technical Personnel

In today's context, the communications technology industry faces a significant shortage of skilled personnel. Because communications technology is an emerging technology, specialized technicians alone cannot address this issue. Therefore, electrical engineering programs and materials science universities should vigorously develop fiber optic communication cable technicians. With the rapid development of fiber optic communication technology, universities must seize this opportunity to rationally adjust their fiber optic communication cable technicians to ensure the integration of fiber optic communication technology and practical operational capabilities, thereby providing society with more outstanding talent. Furthermore, communications technology programs can collaborate with other institutions to enable students to hone their hands-on skills in a real-world work environment, thereby better adapting to society's demands for specialized expertise.

2.2 Warning Signs not Installed Correctly

During the fiber optic cable routing process, appropriate warning signs should be placed according to the planned routing route. Fall prevention equipment should be installed near scaffolding, and a minimum safety distance should be established. However, during construction, some workers overlook the importance of warning signs and the specific details of these tasks, endangering people's lives and property, and in serious cases, affecting the normal use of fiber optic cables. Therefore, we must strengthen our attention to warnings and regularly clean up garbage on the

construction site to avoid fires (Mei, 2021; Chen, 2020).

2.3 Ineffective Security

During the construction inspection of fiber optic cable lines in fiber optic projects, the primary task is to verify the safety and stability of the entire line and ensure that safety inspections are carried out in accordance with regulatory requirements. However, some workers are unfamiliar with the specific construction process, and often miss or omit items during actual inspections, seriously affecting the construction efficiency and quality of fiber optic communication cable lines. Therefore, it is necessary to correctly understand the main working points of fiber optic cables, that is, the overall condition of the fiber optic cables. If any damage is found during the inspection process, it must be replaced accordingly to avoid adverse effects on future construction. In addition, attention should be paid to details such as the specific model and factory date of the cable to strengthen safety inspections.

3. Discussion on Fiber Optic Cable Wiring Technology

3.1 Key Points of Technical Preparation

Before the formal laying of optical fiber cables, technical preliminary work needs to be done. First, the raw materials of the optical fiber cables must be prepared. Secondly, the materials of the optical fiber cables must be inspected to determine whether there are any defects or damages in the optical fiber cables. Then, the damaged optical fibers can be removed or replaced. In addition, during the test process, the mechanical properties, attenuation constant and reflection peak of the optical fiber must be tested to ensure that the optical fiber meets the requirements of the building specifications. After meeting certain conditions, corresponding tests must be carried out to determine the length of the optical fiber and the number of connections. This can not only ensure the normal use of the optical fiber, but also reduce the overall workload of the optical fiber cable (Li, 2020).

3.2 Key Points of Route Retesting

When laying fiber optic cables, the spacing between points must be fully considered and the points must be reasonably determined to lay a good foundation for the next step of construction. When re-surveying the road, relevant staff will conduct in-depth inspections on the construction site to confirm the cable connections and design, thereby improving the accuracy and safety of the measurement. However, when the actual situation of the project is inconsistent with the plan, they need to make necessary adjustments to ensure the scientific and reasonableness of the project.

3.3 Key Points of Panel Matching

During the installation and construction of fiber optic communication technology, relevant personnel must accurately control the total length of the cable and arrange it according to the main locations of the fiber optic laying to ensure the best fiber optic layout with the minimum number of connections. Before carrying out the full layout, the actual quality of the fiber optic cable must be inspected to ensure that the quality of the fiber optic cable meets the requirements, and the various indicators of the fiber optic cable must be adjusted accordingly according to the project requirements to ensure the consistency and consistency of the two.

3.4 Key Points of Optical Cable Laying and Fiber Splicing Technology

(1) The laying of optical fiber cables has relatively high requirements and requires specialized technicians to carry out the construction to ensure that the mode field size of optical fibers of the same specifications is the same. However, in certain specific cases, once an optical fiber cable fails, it must be connected to avoid adverse effects on the transmission of data and information in optical fiber communications. Under appropriate circumstances, the line and the number can be combined for corresponding installation. In high-altitude operations, more adjustments need to be made to the hanging wire to reduce human adverse factors and human adverse consequences (Cai, 2020). (2) In the entire optical fiber communication, optical fiber welding is an important link that affects the quality of the entire project. Therefore, it is necessary to clarify the main construction indicators in this process to further improve the accuracy and efficiency of the work. In addition, before welding, the instruments used must be debugged to improve the accuracy of use. In this way, the materials used can be fully tested during welding. Once defects are found, they must be fully tested to ensure that they meet the specifications.

4. Application of Optical Fiber Cables in Optical Fiber

4.1 Accurate Ranging

Improving the scientific nature of fiber optic routing and ensuring distance measurement accuracy is crucial. During this period, cable safety should be prioritized, with real-time monitoring of the route being conducted to ensure cable laying quality, improve construction safety, and prevent accidents. Simulation methods should also be employed for cabling to ensure fiber transmission quality and operational efficiency. Furthermore, using a road boring machine as support, measurements should be made within the designated area, along with appropriate cleaning. Finally, scientific and rational adjustments should be made to ensure the proper length of the steel pipe foundation, consistently improving the quality of plastic pipe construction.

4.2 Clear Route Signs

In the specific construction of optical cables, relevant markings must be done well, which can not only facilitate the progress of the project, but also greatly improve the efficiency of the project. At the same time, it is also necessary to ensure the feasibility of the layout and laying of optical cables, and to reduce the number of signs as much as possible, especially the signs for direct burial of cables and establishment of pipelines, which should be paid more attention to. In various cases, the method of separating poles and tracks can be adopted to ensure the accuracy of the benchmark and improve the concealment of the benchmark. Try not to set flags in hidden places to avoid losing their original function.

4.3 Protect Fiber Optic Cables

When laying cables, ensure that their exterior is free of scratches, especially the inner side of the conveyor pulleys, which must be lined with rubber to prevent unnecessary damage from pulling on the cable. Any friction on the outer wall of the optical cable can lead to corrosion, hindering signal transmission and affecting communication quality. Therefore, the junction box and connectors should be placed on the ground to ensure they are elevated and protected from damage. Burning or other objects should not be allowed on top of the cables. Furthermore, the entire assembly should be performed according to the original fiber optic serial number. For overhead cables, galvanized steel wire rope should be used as the suspension wire to ensure that the cable and suspension wire are not affected by adverse external factors.

4.4 Communication and Collaboration on Engineering Projects

In fiber optic projects, the construction of fiber optic cables must be carried out in accordance with communication technology and project requirements. This requires that all relevant departments maintain good communication and work according to their respective work requirements to avoid communication equipment being constructed in violation of the contract and design drawings. Before laying fiber optic cables, they need to sign a contract with the relevant contractors and write down the details of the communication technology in detail. All work is within their scope of responsibility and must strictly abide by the terms of the agreement. The cable installation method cannot be arbitrarily changed to avoid any interruptions.

4.5 Overall Stability of Optical Fiber Cables

When implementing construction inspections, in order to ensure the stability of fiber optic cables, safety inspections must be carried out in accordance with relevant regulations. The main thing is to test the fiber optic cables to determine the service life of the cables. Once the cables are aged, new tests are required to ensure the reliability and security of fiber optic communications.

4.6 Appropriate Introduction of Technical Personnel

In today's economic situation, communication technology is a technology with modern characteristics. Therefore, it requires relevant colleges and universities to carry out special training in optical fiber communication technology. At the same time, there must be enough technical personnel to meet the rapid development of the optical fiber communication industry. Therefore, all higher vocational colleges must change the existing education methods in a timely

manner, combine practical applications with theory, and form a group of highly skilled talents with a high overall level (Guo, 2019).

5. Conclusion

Fiber optic cable is an important component of the entire fiber optic communication technology and should be paid more attention to. In the actual construction process, corresponding technical measures should be formulated according to the specific situation, and these technical focuses should be put together to improve the technical accuracy and comprehensiveness of the entire system.

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