

Fibre Optic Termination: Connector and Splicing

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ABSTRACT: -

The fibre optic is the latest medium that has a high-performance signal transmission capability. Thousands of these optical fibres are arranged in optical cable bundles and are used to transmit light signals over long distances. Nowadays, fibre optic work is not limited in the field of communication but encompasses a wide range of applications, such as medical, networking, military. The data sent should be free from any losses to ensure that the information received is secure and of high quality. However, under circumstances, the fibre optic cable may be damaged due to human activity and calamity. This paper will discuss the fibre optic termination refers to the physical connection of the fibre or wire to the device. It is a necessary step for the installation of a fibre optic network. There are generally two ways in which fibre optic cables can be terminated using connectors or splicing techniques.

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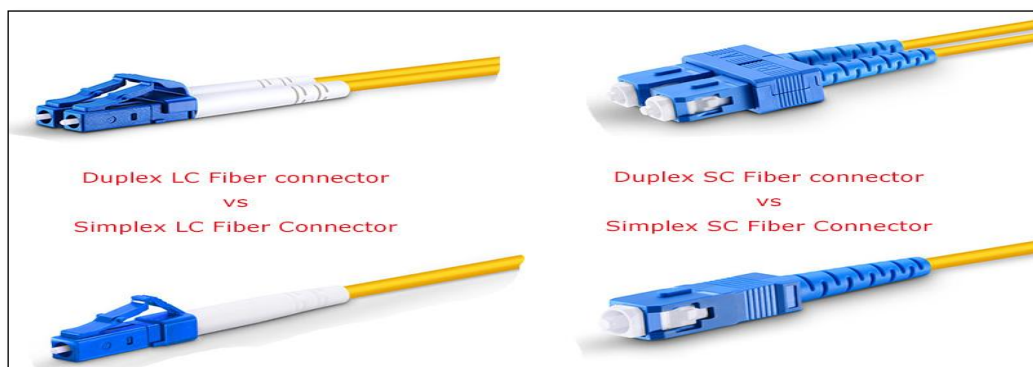
I. INTRODUCTION:

Proper fibre optic termination is extremely important when installing a fibre optic network. A network will be unreliable if this function is not carried out correctly. Proper fibre optic termination protects the fibres from dirt or damage while in use and prevents excessive light loss, making the network run smoother and more efficiently. A lot of attention is therefore being paid to this area today, and more products are appearing on the market to

make fibre optic termination easier and more accurate than ever.

Termination: Using Connectors: -

The fibre optic termination is the connection of fibre or wire to a device, which allows the cable to be connected to other cables or devices. Designed connectors can be placed at the end of the fibre optic line when it is terminated. Since fibre optic technology was introduced long time ago, several connector styles such as SC, FC or LC have been developed.



Fibre optic connectors are unique and must perfectly align microscopic glass fibres to allow communication. Although there are many different types of fibre connectors, they share similar design characteristics. Simplex connector means 1 connector per end, while duplex connector means 2

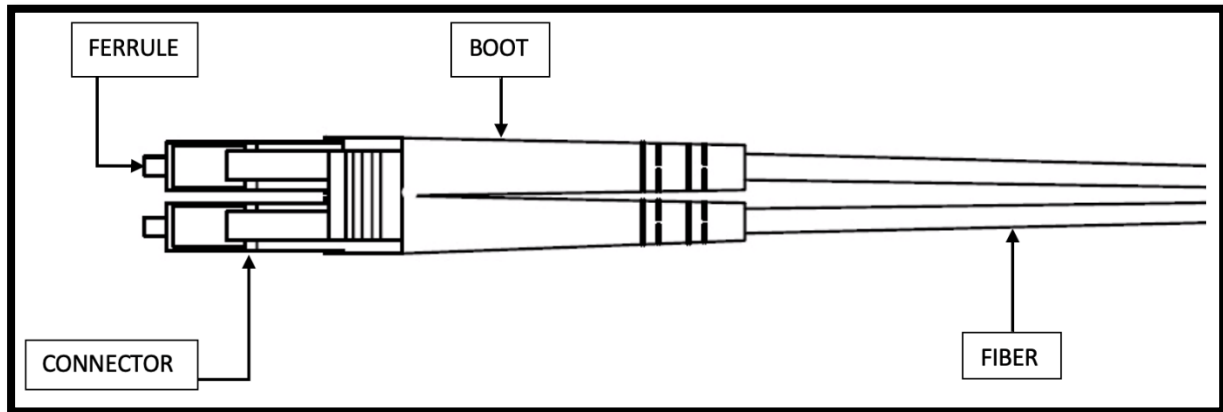
connectors per end. There are three major fibre connector components: the ferrule, the connector body, and the coupling mechanism.

- **Ferrule:** A thin structure that holds the fibre of glass. It has a hollow-out centre that forms a tight

grip on the fibre. Usually made of ceramic, metal, or high-quality plastic, it only holds one strand of fibre.

- **Connector Body:** A plastic or metal structure that holds the ferrule and fastens the jacket and strengthens the members of the fibre cable itself.

- **Coupling Mechanism:** A part of the connector body that holds the connector in place when it is attached to another device.



Termination: Splicing Techniques: -

Fibre optic splicing is the process of joining two or more fibres together. Splicing is commonly used to reconnect fibre optic cables when accidentally broken or to fuse two fibres together to create a fibre that is long enough to run the required cable. Two types of fibre splicing occurred: Mechanical splicing and Fusion splicing.

1. Mechanical Splicing:

Mechanical splicing does not physically weld two optical fibres together, in fact two fibres

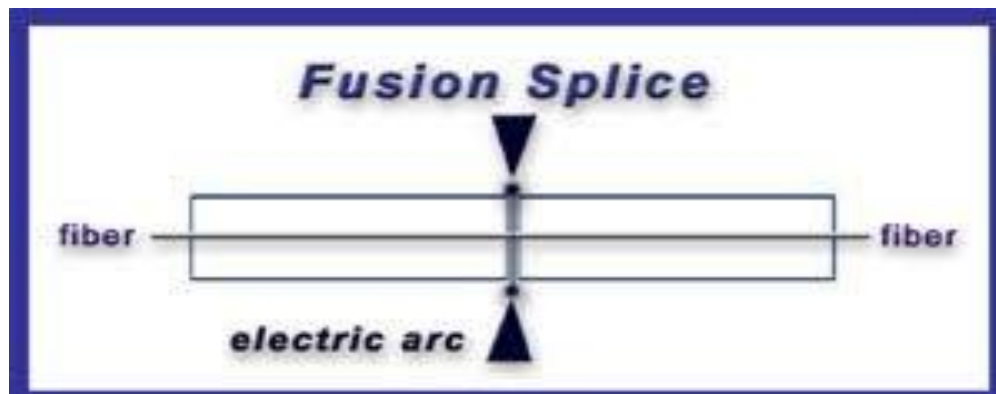
are held end-to-end inside a capillary tube with some mechanical technique. It should be noted that the mechanically spliced fibres are not permanently joined but are precisely held together to allow the light to pass from one fibre to the other. Fibre optic technicians often use mechanical splicing for indoor transmission cables, since the entire process is relatively quick and easy, it is usually used when time and professional skills are limited. This type of splicing is mostly used for emergency repairs and fibre testing due to worse insertion and back-reflection.



2. Fusion Splicing:

In fusion splicing, two fibres are literally fused together by an electric arc. It is the most used splicing process because it offers the lowest loss and the lowest reflectance, as well as the strongest and most stable joint between the two fibres. Fusion

splicing is usually used for outdoor, long-haul, and high-performance single mode networks, and it is performed by a fusion splicer called an automated computer. Practically all single mode splices are fusion. Multimode fibres may be more difficult to merge as the larger core with many layers of glass.



Fusion Splicer Machine:

The machine used to solder two optical fibres together. Most Fusion splicing machines are automated tools that enable you to view the splicing parameters or select the recommended factory settings to monitor the splicing process itself. The fibre ends on the fusion splicer are prepared, cleaved, and put in alignment

fixtures. The fiber ends are heated with electrodes at the touch of a button, brought together, and fused. The aim of fusion splicing is to fuse the two fibres together in such a way that the light passing through the fibres is not dispersed or reflected by the splice, and that the splice and the surrounding area are almost as strong as the intact fibre.



II. CONCLUSION: -

Optical fibre technology has attracted many researchers due to its performance, low attenuation, zero interference, very high bandwidth, and high data-carrying capacity. Although the fibre optic cable has advantages, there are still some disadvantages connected to the difficulty of splicing, limited physical arc of cables, cost, the need of specialists for installation, and the requirement of special testing equipment. However, in the long run, optical fibre will replace copper. In today's network, fibre optic cable is becoming more popular and widely used than before.

REFERENCES: -

- [1]. Two Types of Fibre Optic Termination: Connector and Splicing | FS Community
- [2]. Optical Fibre Fusion Splicer Types (Fusion Splicing Machines) Explaine – Fosco Connect
- [3]. The FOA Reference For Fibre Optics - Fibre Optic Instruments
- [4]. The FOA Reference For Fibre Optics - Fusion Splicing
- [5]. Fibre Optic Termination - Fibre Optic Tutorial
- [6]. Review of optical fibres-introduction and applications in fibre lasers - sciencedirect