

FUNDAMENTALS OF TELECOMMUNICATION

Lab. 8. Splicing of optical fibers



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Introduction

In the practical laboratory session on optical fiber splicing, students are introduced to the essential techniques and equipment necessary for effectively joining fiber optic cables. This lab aims to provide hands-on experience with both mechanical and fusion splicing methods, highlighting their distinct approaches and outcomes in terms of connectivity and signal integrity. Students will engage with a series of exercises that familiarize them with the use of a splicer and other tools, encouraging independent operation and understanding of the splicing process. Through this practical exposure, participants will gain insights into the critical role of precise fiber alignment and the application of protective measures post-splicing, crucial for maintaining the functional integrity and performance of telecommunication networks.

Tasks

4.1

We observed how the teacher splices the fibers.

4.2

1. Fiber stripping

Removed the protective coating, cladding, and buffer from the ends of the fibers to be spliced.
Fig 1 & 2.



Fig. 1 & 2

2. Fiber cleaning

Used alcohol and wipes to clean the fiber shown in Fig. 3

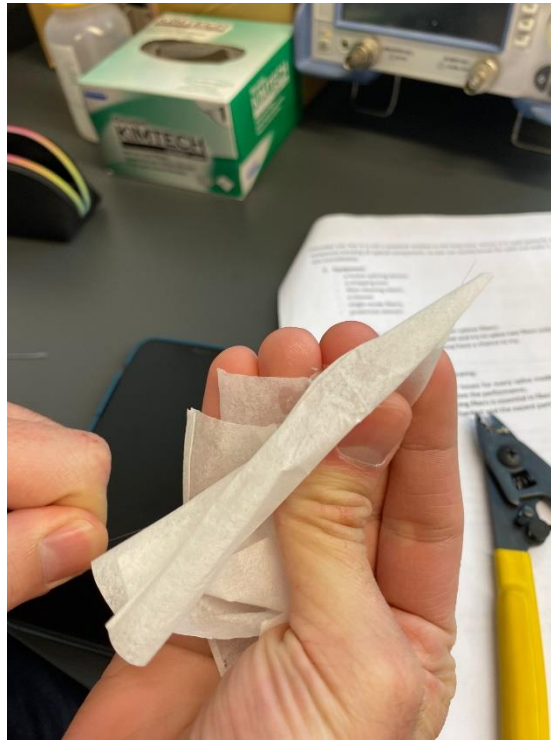


Fig. 3

3. Fiber cleaving

Use a precision cleaving tool to cut the fiber ends cleanly and precisely, ensuring the ends are perfectly flat and perpendicular to the fiber axis. Fig. 4, 5, 6 and 7 showing the steps of use.

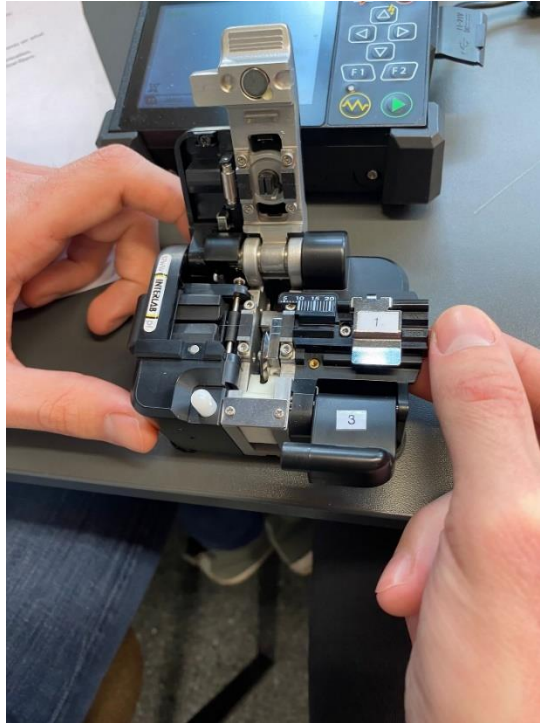


Fig. 4



Fig. 5

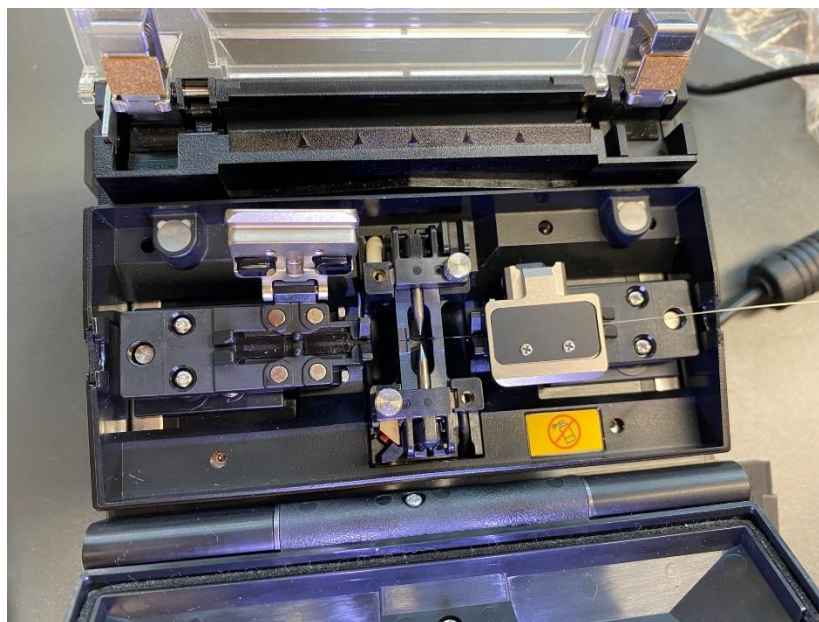


Fig. 6



Fig. 7

4. Fiber fusion

Placed the fiber ends into a splicing machine that automatically aligned them. Then used an electric arc (in fusion splicers) to melt the fibers at their tips, fusing them together. This method provides the most reliable and least lossy splice.

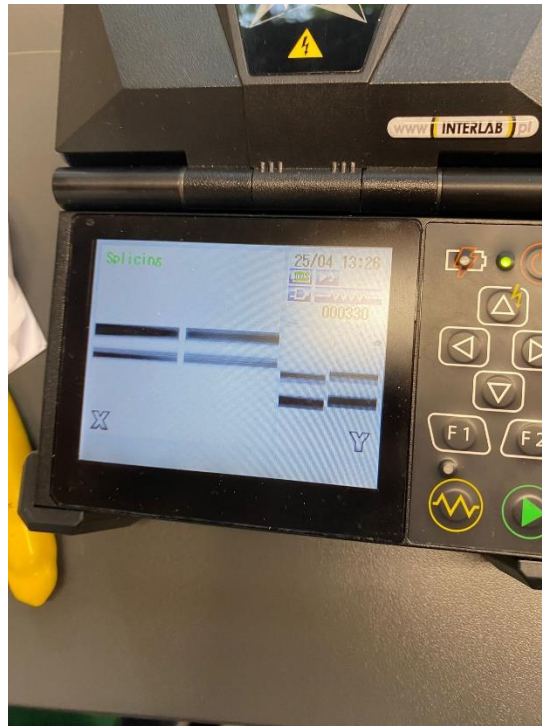


Fig. 8



Fig. 9



Fig. 10

5. Fiber protection

After splicing, to protect the splice with a heat shrink sleeve or a protective gel to provide mechanical strength and protect it from environmental factors.

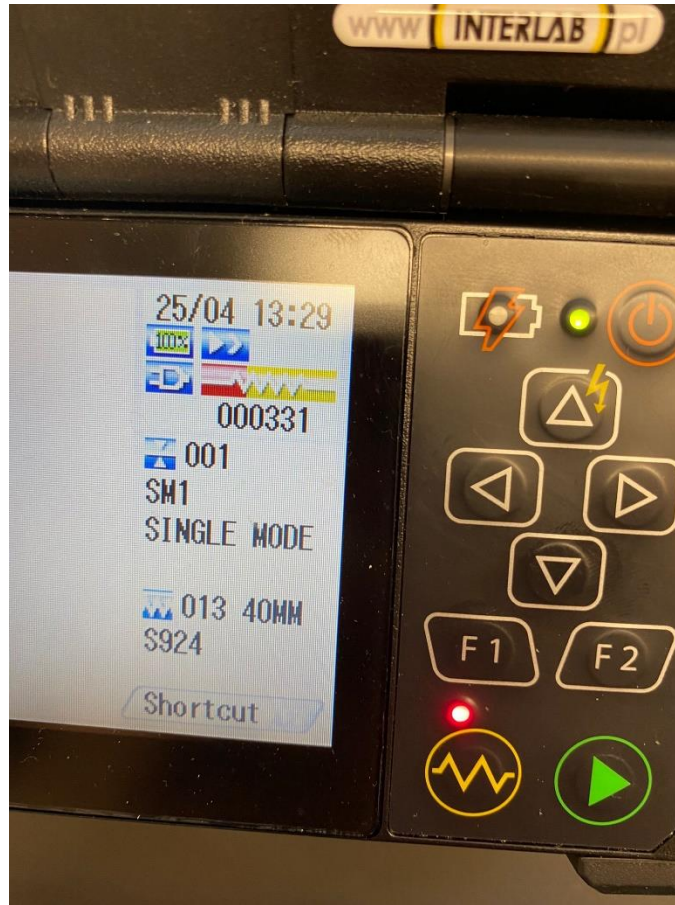


Fig.11



Fig. 12

4.3

We did, it is provided on figures as seen.

4.4

The photos reveal a fiber optic splice with an impressive 1.98 dB loss, well below the acceptable threshold of 0.2 dB. This high loss doesn't suggest precise splicing. For better performance, we need to align the fibers better.

4.5

Fiber splicing is crucial in fiber optics communication, allowing for the repair of damaged cables and the extension of networks with minimal signal loss. This process is essential for transmitting data over long distances efficiently and maintaining system integrity. Effective splicing also facilitates quick repairs, reducing network downtime significantly.

4.6

Hardest part was aligning the fibers. Rest was pretty easy.

Conclusion

In conclusion, the laboratory exercise on optical fiber splicing offers invaluable practical experience in the critical telecommunications skill of joining fiber optic cables. Through hands-on engagement with both mechanical and fusion splicing techniques, we not only learned the procedural steps involved but also understood the practical applications and implications of each method. The exercise highlighted the importance of precision in fiber alignment and the effectiveness of various protective measures in ensuring the durability and reliability of fiber optic connections. As a result, we are better prepared to handle real-world scenarios in fiber optics communication, contributing to the advancement of modern telecommunication infrastructure with enhanced technical skills and knowledge.