

## Technical Insight - Fiber Splicing Technology for Universal Joint

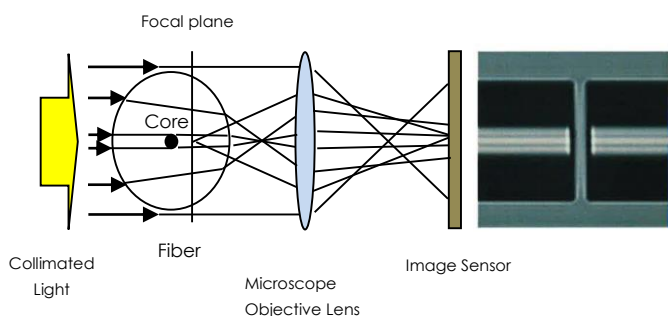
The fiber splicing for the optical submarine cable, which is long-haul and high-capacity trunk telecommunication line, requires low-loss and high-return loss, and its long-term reliability is also significant element in the light of the operation for 25 years.

The fiber splicing for UJ/UC has adopted the fusion splicer of which features are direct core monitoring and automatically core alignment, and in order to ensure the long-term reliability the means to suppress as much as possible microcracks and strain to the fibers are provided.

As of July 2014, the available number of fiber interconnections released for the UJ fiber splicing is 337.

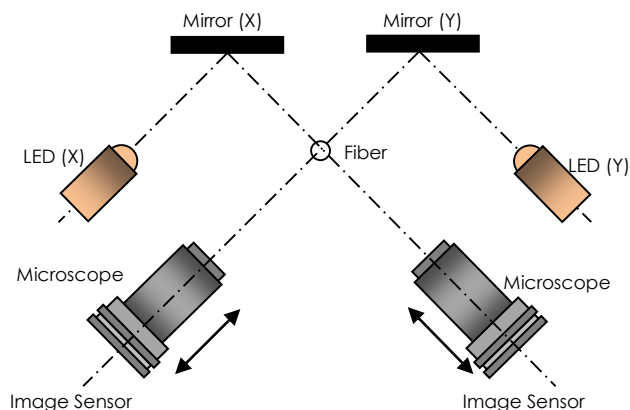
### Principle of Fiber Core monitoring

When the collimated light illuminates the optical fiber constituted with different refractive indices layers, the transmitted light through the fiber caught with the objective lens of the microscope is imaged on a sensor as contrast of the refractive-index difference of an optical fiber.



### Principle of Fiber Core Alignment

Utilizing the detected position information of fiber core, the alignment mechanism will adjust both fiber cores to be in the straight line.



### Principle of Arc Fusion Splicing

With the intense heat of arc discharge generated between tungsten electrodes, the fibers faced will be melted and subject to the fiber splicing conditions specified, e.g. intensity of arc discharge, distance of opposing fibers and distance of pushing fiber, the fibers faced are subsequently joined together.

### Ensuring Long-term Reliability

Taking into consideration the long-term reliability of the optical submarine cable, suppressing microcracks and strains will bring less failure probability of the fiber spliced portion.

In order to prevent the microcracks to the bare fibers during the fiber preparation and splicing operations, consideration is given to ensure that the fiber coating is clamped only thus ensuring that the bare fiber is not touched.

As a further significant feature, by means of the transfer arm mounted on the splicer, it is possible concurrently to perform 0.5% proof test and encapsulation while minimizing the strain, so that the failure probability of the fiber spliced portion realized is  $10^{-6}$  over the 25years of the optical submarine cable operation term.