

# A Fusion Splicer Primer

Arc fusion splicing is commonly used to permanently join optical fibers. An arc fusion splicer is expensive, however the cost per fusion splice is usually low, and technical splice performance is excellent.

## Basic elements

- A cleaver is a separate tool required to cleave fibers with a precise flat end face. Get a good one, and maintain it properly. It will critically affect splice quality. If you have to economise, don't do it on this item.
- The fusion splicer's fiber alignment may be by a simple V-groove arrangement, or by a more expensive active alignment arrangement, which produces lower losses, and is also less sensitive to dirt. This choice depends on your optical fiber splicing requirements, volume and budget. Active alignment splicers are a favorite for regular use.
- A common cause of field splicing failure is dirt adhering to the splicer v-groove, or dirt left on a fiber. V-groove dirt causes repetitive splice failure, and fiber dirt causes random splice failure. In both cases, cleaning procedures may need to be enforced or reviewed. In general, auto alignment machines are much more dirt tolerant than fixed v groove machines, which makes them preferred for field use.
- The arc fusion splicer electrodes provide heat to melt the glass ends together. Correct electrode maintenance is critical. In particular, don't make extensive use of the arc to blow dirt off the glass ends during fibre splicing, or the electrodes quickly become contaminated by the dirt particles.
- A heater is used to apply a heat shrink splice protector. This shouldn't be too aggressive, or residual glass stress left after cooling down can cause later splice unreliability. So use the manufacturer's settings, or ask them before a change. The heater must not cause damage or bubbling to the fiber's plastic coating, or later splice failure can occur. Some people use multiple heaters to increase throughput.
- The splice protector is critical. It must cover the bare glass, plus a bit more. The bare glass must be straight (not bent) inside it, or later joint failure can occur. The splice protector must keep out moisture and atmosphere, both of which can weaken splice joints and cause later failure.
- The fusion splicing technician needs procedures, training and familiarity with the particular apparatus, and both splicers and cleavers require programmed inspection & maintenance. If any of these are not happening, expect fibre splicing problems one day!
- The most common causes of ongoing splicing failure are dirty or blunt splicer electrodes, and a worn or badly adjusted blade on the cleaver. So both splicers and cleavers require programmed inspection and maintenance by an expert technician.