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Applications
Engineering Note

Mass Fusion Splicing of 200-Micron Fibers

AEN171, Revision 0

200-micron fiber was developed due to the growing need for improved fiber density and smaller cable sizes. Single-fiber splicing is capable with either cladding or core alignment machines since the glass (Core and Cladding) in the optical fiber has the same dimensions for both 200-micron and 250-micron fibers. Mass fusion splicing with loose 200-micron fibers requires a specific process to ribbonize and prepare the fibers, for splicing, when using a splicing machine designed with V-grooves at 250-micron spacing. Along with loose 200-micron fibers, they are now being used in ribbon form, to increase the fiber density even higher. These processes were designed based on the need for mass fusion splicing which can deliver better splicing efficiency and lower cost.

The methods below are designed to allow mass fusion splicing, using readily available equipment, without changing splice attenuation or adding complexity to the splicing process.

Methods and Procedures for Mass Fusion Splicing Loose 200 µm

There are two primary methods for arranging and mass fusion splicing loose 200-micron fibers, either to themselves or to 250-micron fibers, in the field. Multiple vendor methods are discussed below.

One method is to field ribbonize the loose fibers into a solid ribbon, as you would when splicing loose 250-micron fibers. One example of a ribbonizing tool is shown in Figure 1 below.

Figure 1. Example Fiber Arrangement Tool

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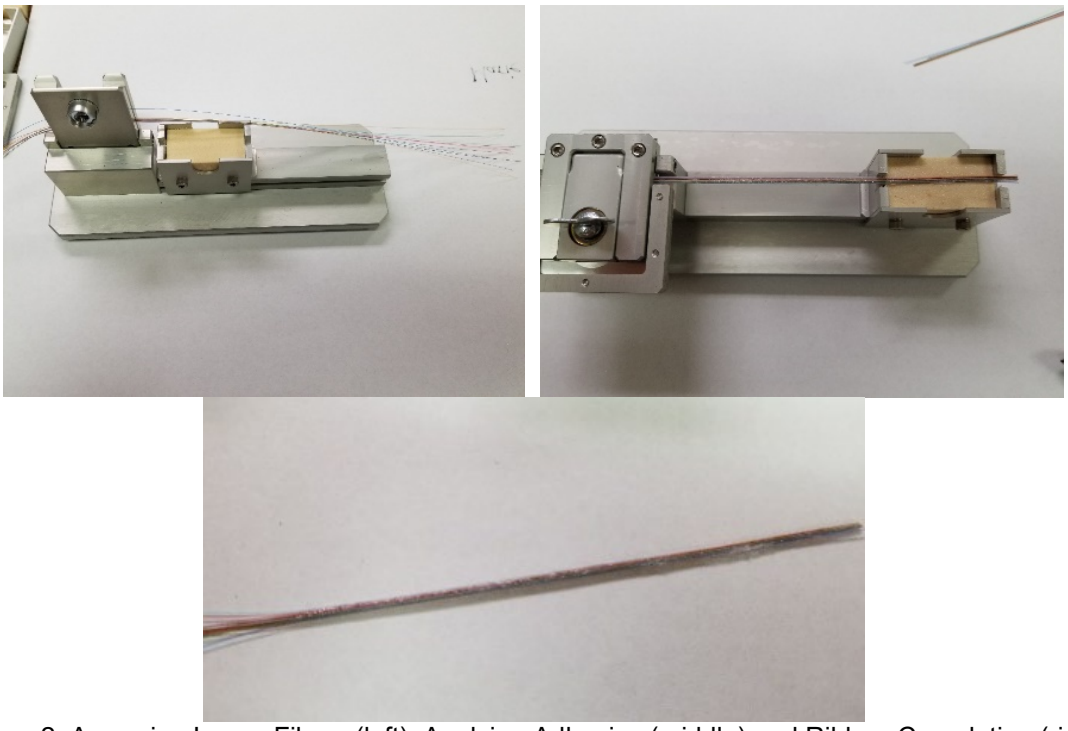

Figure 2. Arranging Loose Fibers (left), Applying Adhesive (middle) and Ribbon Completion (right)

The solid 200-micron ribbon is then hand split into three 4-fiber ribbons for a length of four inches, then inserted in the fiber holder, similar to Figure 7 below. The fibers can then be stripped, cleaned, cleaved, and spliced using a 250-micron splice machine.

Another method is to use a fiber arrangement tool that spaces the 200-micron fibers into 250-micron spacing. An example of this tool is shown in Figure 4.

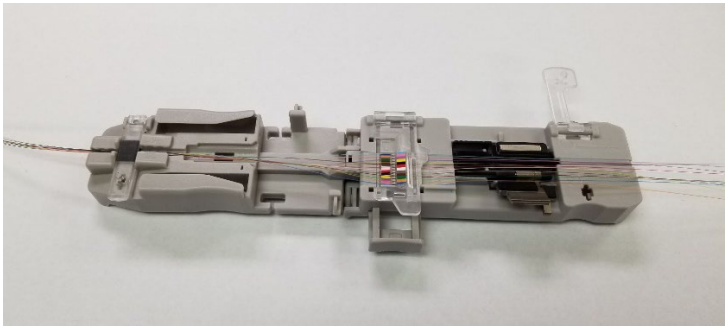

Figure 4. Another Fiber Arrangement Tool

During this process, the loose fibers are inserted into individual slots, then compressed and laid in the standard 12-fiber grooved ribbon handler. This process does not require glue or ribbon splitting. The fibers are then stripped, cleaned, cleaved, and spliced to a 250-micron factory ribbon. The process for arranging the loose fibers is shown in Figure 5 below. It is also possible to apply a glue/epoxy/tape to the fibers, for splicing later, instead of inserting the fibers into a holder. When using the specific tapered fiber holder with this arrangement tool, the ribbons are not required to be split into three groups, to splice in a 250-micron splice machine. Not all fiber holders or splice machines may be compatible with this type of tool.

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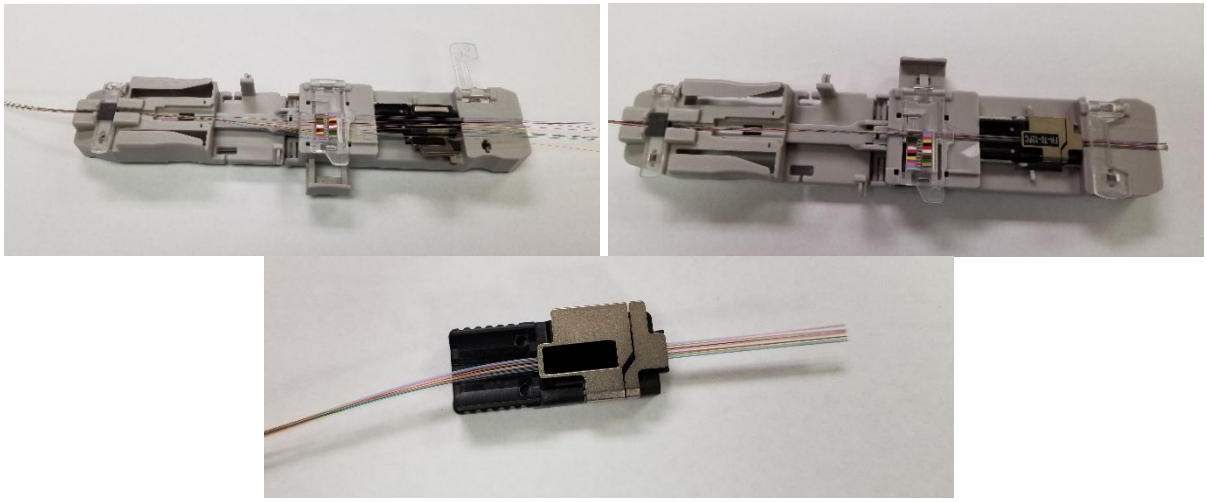

Figure 5. Arrangement Process: Insert (left), Arrange (right), and Prepare for Splicing (below)

Methods and Procedures for Splicing Solid 200 µm Ribbons

Multiple vendors offer a process that enables the splicing of 200-micron ribbons, to 250-micron spaced or 200-micron spaced ribbons, while using a traditional 250-micron splice machine. Table 5 lists the holders used with each vendor's machine to perform this splicing.

Manufacturer	Holder PN
Fujikura (AFL)	FH-R200-3x4
Sumitomo	PCH-12

Table 5. 200 µm Ribbon Holders

Each of these holders use a method that requires splitting the 12-fiber ribbon into three 4-fiber ribbons for a short distance (~4 inches). The Corning 200-micron ribbon is designed to be hand splittable into three 4-fiber sections. Figure 7 below shows the split ribbon inserted into a holder, as listed above.

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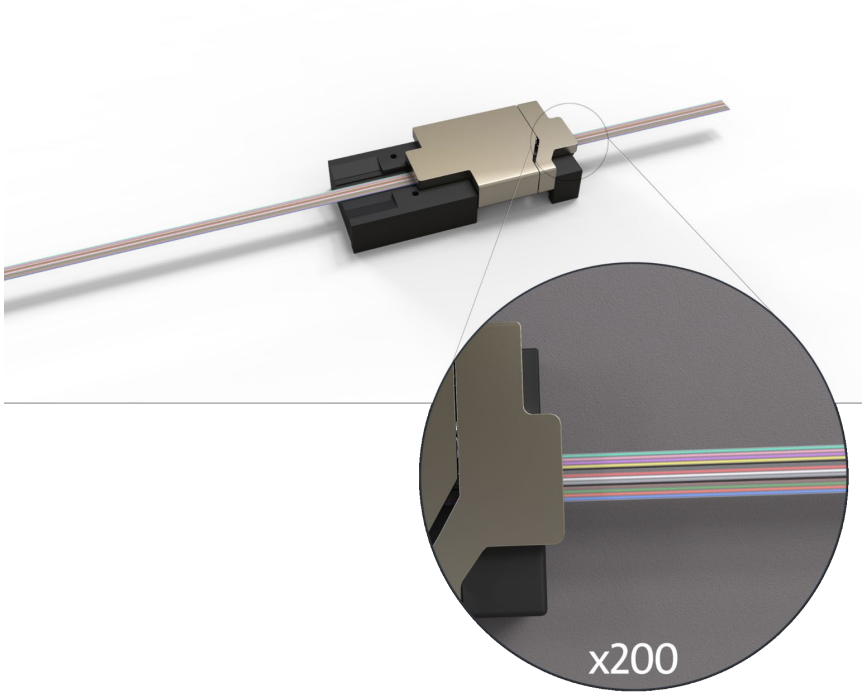

Figure 7. 200 µm Ribbon in Holder

Once the ribbons are split and inserted into the holders, the ribbons can be stripped, cleaned, cleaved, and inserted into the splice machine like conventional ribbon.

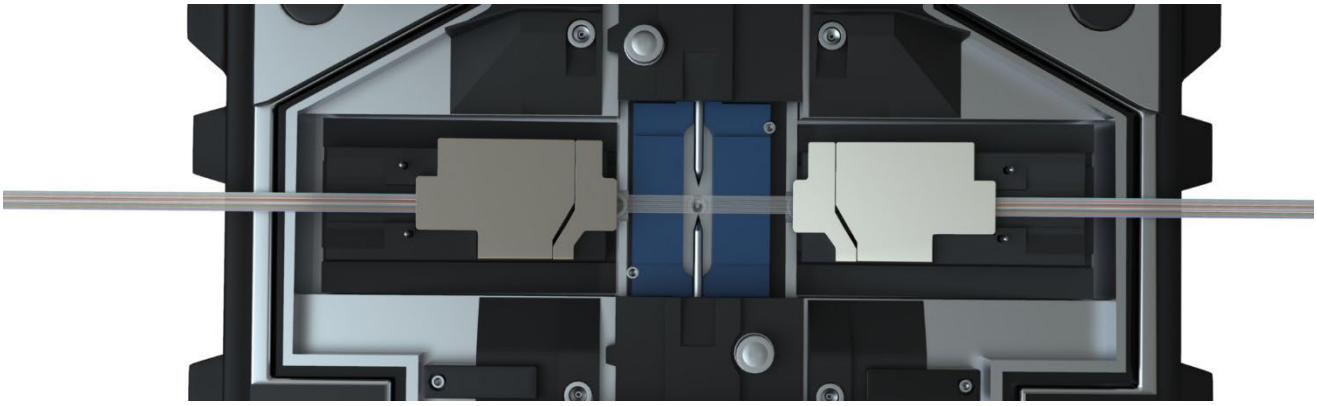

Figure 8. Prepared 3x4 Ribbon in Holder and Splice Machine

Another method of splicing a solid 200-micron ribbon is to use a 200-micron specific splice machine. This process is only an option when splicing 200-micron to 200-micron. Using this process, the 200-micron ribbons can be stripped, cleaned, cleaved, and spliced in the same manner as conventional 250-micron solid ribbons or 250-micron field ribbons.

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- Split the 3x4 groups back approximately 3 to 4 inches.

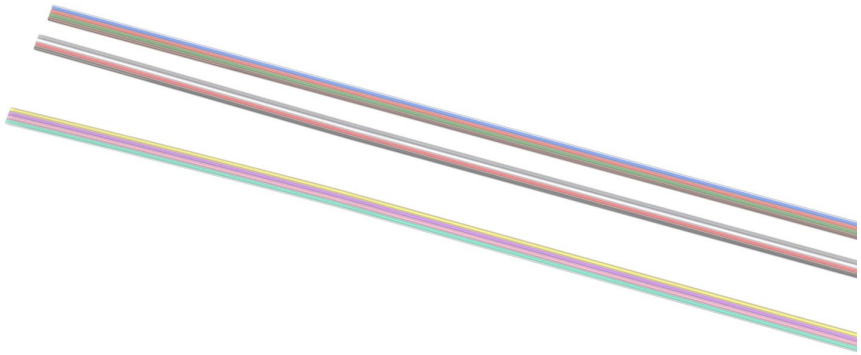

Figure 9

- Trim excess overhang on the 3x4 groups, if splitting solid field or factory ribbons.

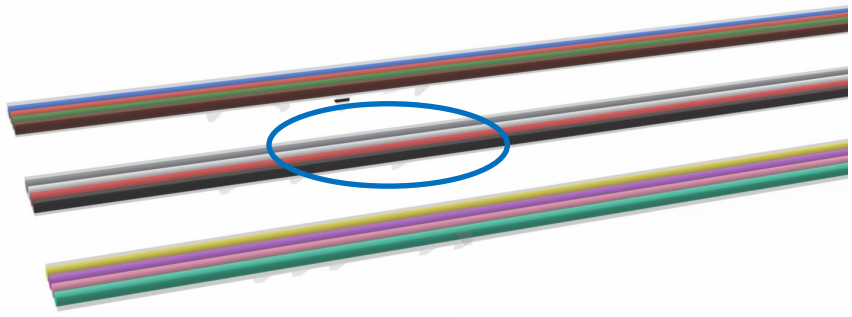

Figure 10

- Place the 200 µm ribbon in the handlers longer than usual so you will have some to pull through the handler to help the groups align into the grooves of the handler.

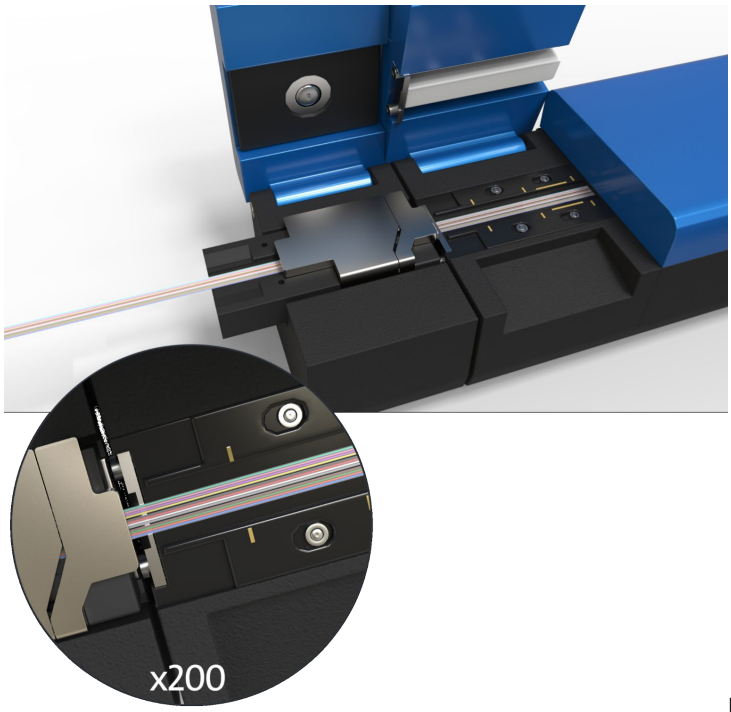

Figure 11

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- The 4-fiber groups should have visual horizontal spaces between them, so they will align with the 250 pitched V-grooves.

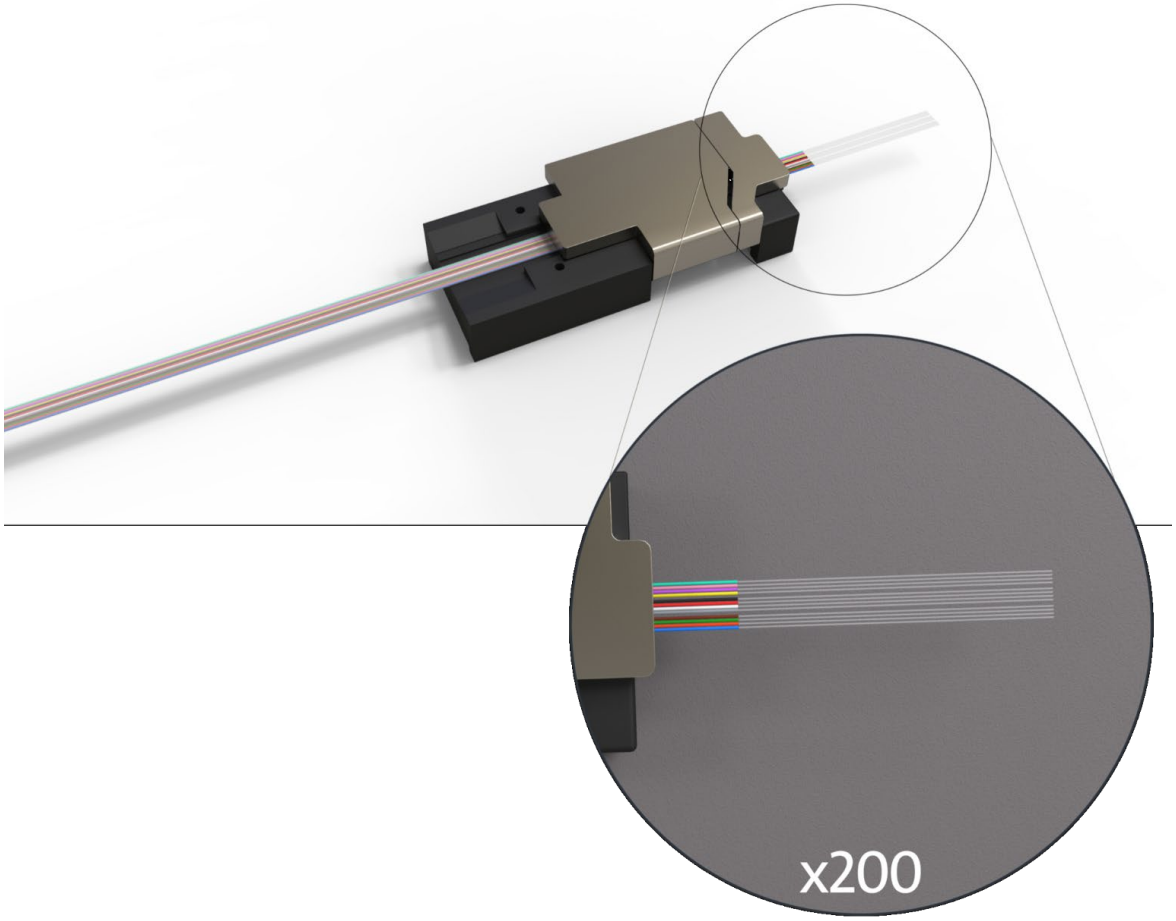

Figure 12

- If the fibers look like they are splayed out in different directions, reseat the fibers in the handler.
- Make sure the ribbon/fiber lengths are even and there is no extra fiber length behind the handler between the groups.

Figure 13

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- When stripping the ribbon, make sure the ribbon doesn't pull through the handler. If it does, make sure the handler is thoroughly cleaned with a cotton swab and alcohol. Extra pressure may need to be applied to the handler.
- Thermal strippers are set to optimize 250-micron solid ribbons. The timing/heat may need to be adjusted to optimize the stripping of 200-micron field and factory ribbons.
- Maintaining the cleanliness of the thermal stripper allows it to function more consistently.
- If the fibers are overlapping in the V-grooves, use a cotton swab or hard bristle brush to spread/brush the fibers allowing them to fall into the V-grooves.

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