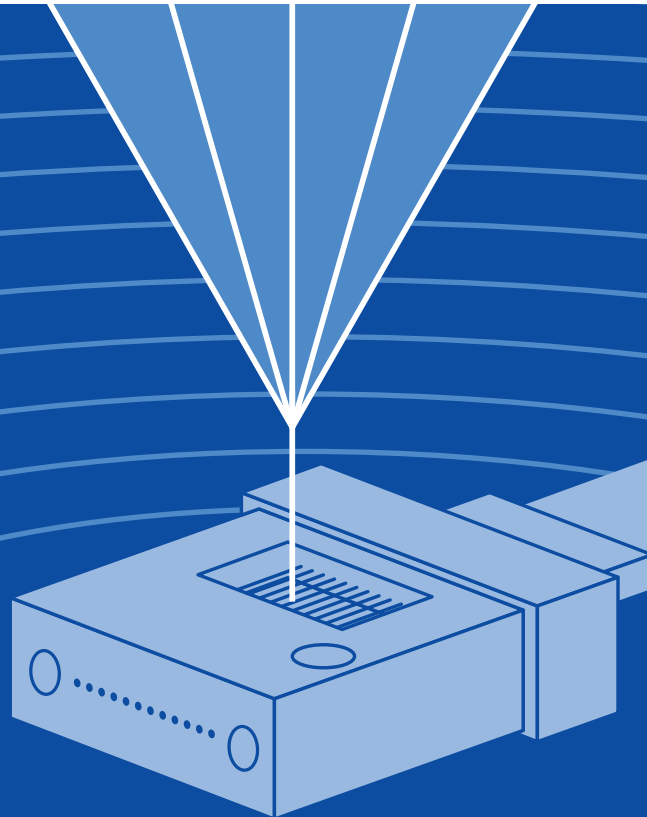


# MT Ferrule Epoxy Injection Techniques

**OCTOBER 2017**  
*Rev. 01*

Issued by:  
Engineering  
Department

Created by:  
Andrei Vankov  
Emmanuel Kolczynski

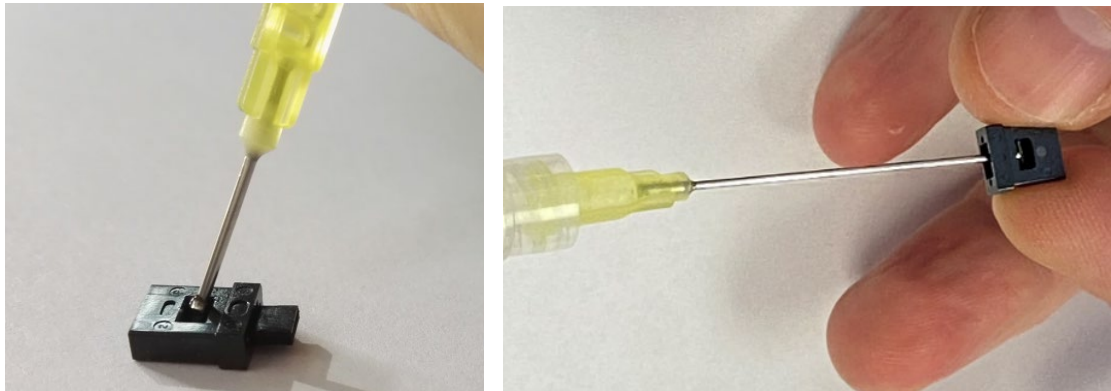


## **1.0 Purpose of this document**

The MT Ferrule has been around for over 20 years and throughout the years there have been many different processes and recommendations when it comes to terminating onto this ferrule. The purpose of this document is to provide guidance on the control of epoxy injection into the MT ferrule by providing a variety of options that have been proven to work. Additionally, this document will outline how epoxy can enable the MT ferrule angle grinding without the need for a flat polishing step.

## **2.0 Epoxy Control**

Epoxy can be injected into the window of the ferrule using an appropriate applicator at a slow steady rate, completely filling the window or from the back of the ferrule. Different operators will have their own preference based on experience and ease of handling. Automated dispensing equipment can help with the volume dispensed and increase consistency.

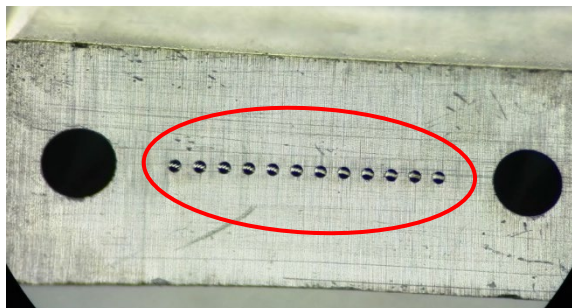


*Figure 1 Proper epoxy injection techniques*

The amount of epoxy injected ideally should be level with the top edge of the window, not above. Over injection of epoxy will form a dome of epoxy above the height of the window when fully cured. This dome of epoxy prevents the polishing fixture from

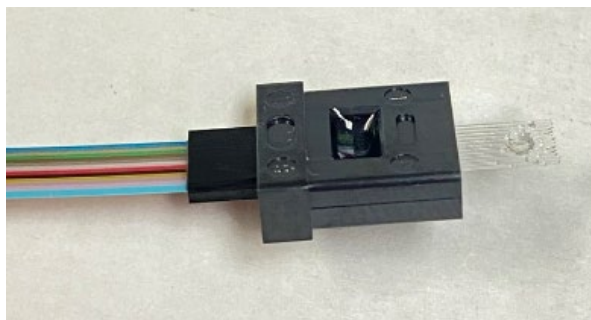
sufficiently clamping the ferrule for polishing, thus, adversely affecting critical geometry measurements.

After the epoxy injection, small beads of epoxy should be visible at each fiber hole. The beads of epoxy should not run when the ferrule is placed horizontally on a flat surface.



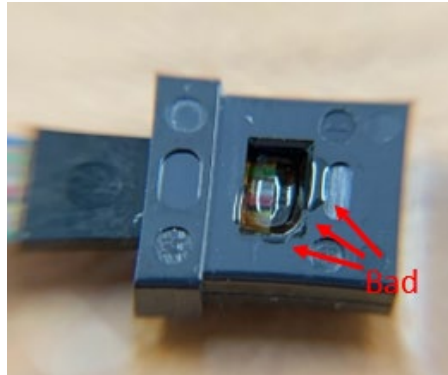
*Figure 2 Epoxy must be visible in the fiber holes*

The fibers should then be inserted slowly and smoothly to prevent fiber damage or breakage. If there is any resistance, back off and try again. There is a small pedestal inside of the ferrule that aids with the alignment of the fibers.



*Figure 3 Ideal epoxy amount (left) and excessive epoxy amount (right)*

Be very careful not to get any epoxy on the outer surface of the ferrule, as this will affect how it sits in the polishing fixture. If necessary, carefully wipe off the outside surface of the ferrule with an alcohol dampened lint-free tissue to remove any extra epoxy. The end-face epoxy lines must be consistent from ferrule to ferrule as this will be the key to successful polishing. Even the smallest amount of epoxy can carry significant consequences for the finished product.



*Figure 4 Epoxy on the ferrule surface is bad*

The ferrule should then be held vertically after fiber insertion to allow epoxy on the fibers to flow down and accumulate on the ferrule surface. Epoxy must encapsulate the fibers completely at the ferrule/fiber bond on top.



*Figure 5 Proper epoxy amount*

The accumulated epoxy thickness for angle MT polishing ideally should be around 0.2mm. Angled polishing exerts an angular force, that when applied to a tall, thin ridge of epoxy has a high risk of fiber breakage. Controlling the height of this ridge of epoxy to 0.2mm eliminates fiber breakage and allows direct angled polishing without the need for a flat polish process to remove fibers and epoxy before angled polishing. The epoxy bead also

assists with the cleaving of the fiber. The epoxy encapsulates the fiber and when cleaving will protect the fiber from cracking into the ferrule.

Ideal epoxy bead should be approximately 0.2 to 1mm in width and not close to the guide pin holes

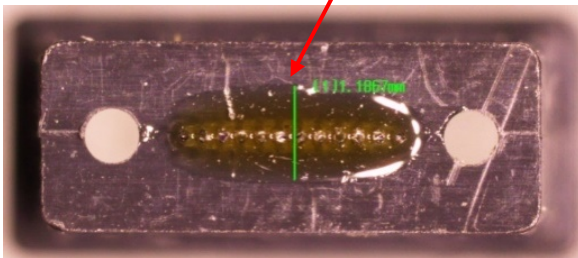


Figure 6 Ideal epoxy bead thickness

Excessive epoxy leaks into guide pin holes

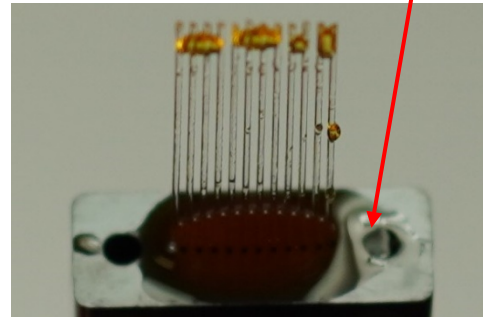


Figure 7 Epoxy interference with guide pin holes

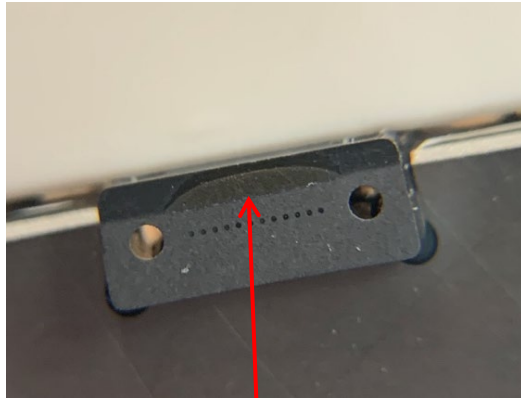
It's important to note that multimode fibers have a larger core and are more susceptible to core damage during epoxy curing. If the epoxy bead is too thick, core cracks may form during epoxy curing stress and cannot be polished away. With thinner epoxy beads, cracks will not likely to occur or occur not below the ferrule surface, which can be polished away.

It is important to remember to check the height of epoxy in the ferrule window before curing. Insertion of fibers into the ferrule will draw some of the epoxy out of the ferrule window. A pronounced dip/concave shape to the epoxy means a lack of epoxy, and it must be topped up. Lack of epoxy will affect long term reliability.

### 3.0 Additional polishing advisory note

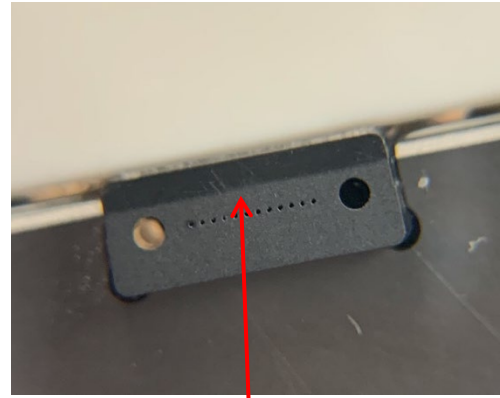
The higher the number of fibers, the higher the force required to produce and maintain physical fiber contact. Therefore, control of ferrule length is critical making it imperative to not over-polish. Over-polishing will affect the length of the ferrule, thus, affecting the force exerted to ensure physical contact of mated end-face fibers.

IEC 61754-7 stipulates that the unpolished (flat) area of an angle polished ferrule (single mode) can be a maximum of 0.8mm. Measuring this area is difficult, and removal of the ferrule from the polishing fixture to do so is not recommended due to the adverse effect on end-face geometry. A simple rule of thumb is to polish until the angle has overlapped the fiber by one fiber diameter, which can be “eyeballed”.



Here is can be clearly seen the thicker epoxy bead most likely will not be polished away. However, slight pressure with a sharp blade can remove it.

*Figure 8 Epoxy interference with mating*



Here is can be clearly seen that the polished angle has passed the single row of fibers and guide pin holes

*Figure 9 Ideal polishing result for MT/APC angle*

**For additional polishing advise, please refer to relevant SENKO polishing procedures or contact your local representative.**

**USA**

East Coast +1-508-481-9999  
West Coast +1-858-623-3300  
Texas +1-972-661-9080  
Sales-Americas@senko.com

Mexico & Central America +1-858-623-3300  
Sales-Mexico@senko.com

Brazil and South America +55-21-3736-7065  
Sales-Brazil@senko.com

**Asia-Pacific**

Hong Kong +852-2121-0516  
Shanghai +86-21-5830-4513  
Shenzhen +86-755-2533-4893  
Thailand +66(0)2-163-2798  
Australia +61(0)3 9755-7922  
Sales-Asia-Pacific@senko.com

**Japan**

Yokkaichi City +81-59-352-1121  
Tokyo +81-3-5825-0911  
Sales-Japan@senko.com

**United Kingdom**

UK +44(0) 1256 700880  
Sales-UK@senko.com

**Europe**

**Spain & Portugal**

Sales-Iberia@senko.com

**Germany**

Sales-Germany@senko.com

**Italy**

Sales-Italy@senko.com

**France**

Salesfrance@senko.com

**Other European Countries**

+44(0) 1256 700880  
Sales-Europe@senko.com