Cutting Fiber Optic Connectors for Cross Sectional Evaluation

1.0: Purpose

Optical inspection of fiber optic connectors is commonly done to evaluate the manufacturing process. Closely monitoring the process from sample to sample and run helps to ensure the quality necessary for maintaining good products. Current preparation techniques for evaluating these types of samples take up to 2 hour or more, creating a bottleneck in specimen preparation. This experiment describes a method used for low damage cutting of fiber optic connectors to help reduce specimen preparation time and to minimize the number of processing steps needed for completing a sample.

The effectiveness of cutting fiber optic connectors using a wire saw for producing a relatively smooth cut surface will be investigated. Evaluation of cutting time, quality of the surface following cutting, and the ease of implementation all will be discussed.

2.0: Experiments and Procedure

Several fiber optic connectors were obtained for cutting experiments using the Model 850 Wire Saw. Different connector types were mounted in a resin mold and encapsulated to ensure that all of the components contained in the connector were preserved following the cutting process. Below is an example of the connector type used for evaluation.

Figure 1: Image of the fiber optic connector used for the cutting experiment. The connector has been embedded in a resin mold to preserve the geometry of the part and prevent other portions of the connector from falling out following the cutting process.

Prior to cutting on the Model 850 the excess resin was cut away using a Model 865 Diamond Band Saw. The Model 865 is very good for cutting virtually any material in a relatively short amount of time. The specimen was cut into a small rectangle of approximately 20 x 35 mm using the Model 865. Cutting time took approximately 6 minutes to complete the cut.

Following the reduction of material, the specimen was mounted onto a graphite plate using low melting point wax (MWH 135) which dissolves in acetone. The specimen was then mounted onto the Model 850 Wire Saw and prepared for cutting.

Model 850 Cut

For wire saw cutting, the sample was first aligned to the wire by visual inspection. The wire was aligned on the specimen such that the cut would take place directly through the center of the specimen, creating a good cross sectional profile of the specimen for inspection.

Cutting was performed using a 0.010”stainless steel wire blade in conjunction with an abrasive slurry. The slurry was pumped onto the surface of the specimen using the Model 85030 Abrasive Slurry Recirculating System to reduce the amount of user intervention required and ensure constant slurry application to the cutting area.

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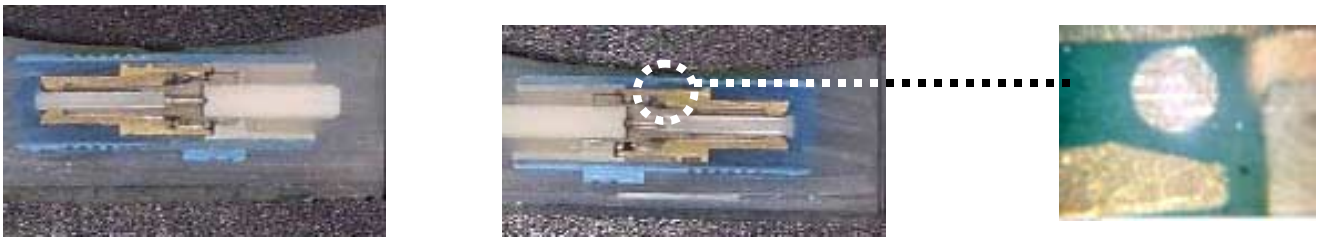
Cutting parameters were as follows:

Load:	50 grams
Wire:	0.010" stainless steel
Speed:	300 rpm
Slurry:	Automatically applied to sample
Abrasive:	23 micron BC abrasive slurry (mixed to a ratio of 1 part abrasive powder: 4 parts glycerine: 1 part water)
Cutting Time:	35 minutes

3.0: Results

Following the cutting operations the specimen was evaluated using a light microscope and stereo microscope. Below are images of the as cut surface following cutting with the Model 850.



Cross Section A **Cross Section B** **OLM Image (120 x)**

Figure 2: Images showing the fiber optic connector following cutting on the Model 850 Wire Saw. The connector is first shown with both cross section views after the cutting process. Note the clean surface and clear delineation of each component following the cutting process. A optical light micrograph (OLM) is shown at right, demonstrating the clean surface and clear distinction between the discreet components contained in the connector.

4.0: Conclusion

Using wire saw cutting methods combined with a quick bulk cutting instrument, precise cross section cutting of fiber optic connectors can be done in less than one hour. Optical inspection is possible following the as cut sample without the need for additional processing steps such as polishing. By cutting these connectors using this method, specimen preparation time can be redued by nearly one half of the previous methods used for specimens of this type.

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