

A Novel Guiding Mechanism of Micro Core Pins in the Micro Injection Molding of High-Aspect-Ratio Optical Fiber Ferrules

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This study focused on research and development of optical fiber ferrules by plastic micro injection molding technique. Each ferrule (2.5mm in outer diameter) has a through hole in the center. The inner diameter of the micro through hole is $125\pm 1\mu\text{m}$, and its length is 9mm. During micro molding, how to keep the micro core pin high aspect ratio at the center becomes a critical issue. In this work, a guiding mechanism is introduced to keep the micro pin at the center during molding. It included a guiding slide and a spring behind. Such a guiding system can help reduce the chance of mis-alignment of the micro core pin and increase pin's life time. Taguchi's design of experiment was used to evaluate the effects of different processing parameters on the final properties. Experimental results reveal that the higher the spring force, the lower the shrinkage. And cavity pressure can be higher either by increasing spring force or holding pressure. In order to obtain better uniformity of diameters at different locations, diameters at three longitudinal locations (front, middle and back) were measured. Measured data showed shrinkage of diameter in the middle is greater than those at two ends. It is because the two ends cooled faster than the center region. Uniformity of the diameters can be improved by applying higher mold temperature or appropriate holding pressure and time. The design concept of presented guiding mechanism is also suitable for molding micro tubes, especially for high aspect ratio cases.