

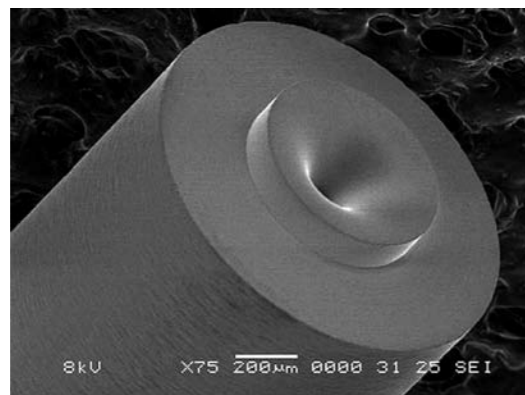
Micro Precision Nozzles

By definition, a nozzle is a mechanical device designed to control the characteristics of a fluid flow as it exits (or enters) an enclosed chamber or pipe via an orifice. Small Precision Tools (SPT) is a world leader in Ceramic Injection Molding (CIM) of microminiature complex nozzles for use as microfluidic components in medical, industrial and electronic applications. <25 micron molded holes are held to +/- 1µm. Materials include Alumina, Zirconia, Zirconia Toughened Alumina (ZTA) and Polycrystalline Ruby. Some nozzles are formed in tungsten carbide by micro-hole EDM with features < 25 micron. Ceramics provide excellent solutions to tough engineering challenges; they excel where traditional materials fall short.



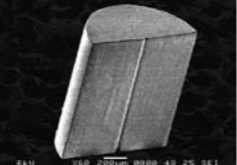
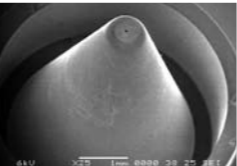
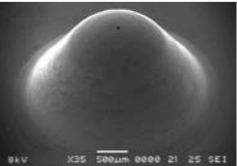
Flow Cytometry Nozzle

One application where SPT's ceramic nozzles excel is in Flow Cytometry. Flow cytometers are able to analyze several thousand particles every second, in "real time," and can actively separate and isolate particles having specified properties. A critical component of the device is the "flow cell", this is where the nozzle creates a liquid stream (sheath fluid) that carries and aligns the cells so that they pass single file through the laser light beam for sensing.

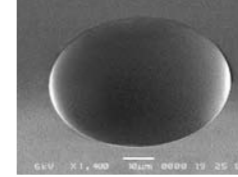
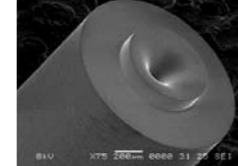
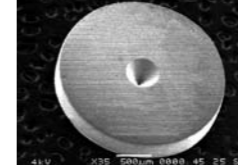
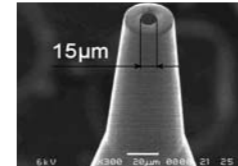
The interior shape of this nozzle is critical to the performance of the flow cytometers. Repeatability of the features of the ID and OD of these nozzles is a major requirement.



Ceramic and Metallic Nozzles with Small Precision Holes

	<p>Ceramic Nozzle with Micro Hole</p> <p>Application: Medical Device Material: Al₂O₃ 99.9% SPT Material Code : C Weight [g]: 1.2 Tolerance [mm]: ± 0.003 (Hole) Special Characteristics: Hole Ø 0.05 mm</p>
	<p>Ceramic Micro Dispensing Nozzle with Smooth Internal Finish</p> <p>Application: Adhesive Dispensing Device for the Chip Industry Material: ZrO₂ / Al₂O₃ SPT Material Code : AZ Weight [g]: 0.4 Tolerance [mm]: ± 0.005 Special Characteristics: Smooth Surface Ra 0.2µm resists clogging. Available internal orifice from 0.05 - 0.2mm</p>
	<p>Ceramic Nozzle, Long Bore</p> <p>Application: Ink Jet Material: ZrO₂ SPT Material Code : Z Weight [g]: 0.1 Tolerance [mm]: ± 0.002 Special Characteristics: Straight, long bore Ø 0.04 x 1mm</p>
	<p>Ceramic Pharmaceutical Jet Nozzle with Flow Control</p> <p>Application: Medical Device Material: Al₂O₃ / ZrO₂ SPT Material Code : AZ Weight [g]: 0.75 Tolerance [mm]: ± 0.003 Special Characteristics: Ø 0.05mm Orifice. Complex geometry of the body</p>
	<p>Metallic Jet Nozzle in Tungsten Carbide</p> <p>Application: Pharmaceutical Device Material: Tungsten Carbide Weight [g]: 3.5 Tolerance [mm]: ± 0.001 Special Characteristics: Ø 0.025 mm orifice</p>

Ceramic and Metallic Nozzles with Small Precision Holes

	<p>Ceramic Nozzle Orifice</p> <p>Application: Medical - Cell Sorting Material: Al₂O₃ / ZrO₂ SPT Material Code : AZ Weight [g]: 1.0 Tolerance [mm]: ± 0.001 Special Characteristics: Ø 0.070 mm orifice</p>
	<p>Ceramic Flow Cytometry Nozzle</p> <p>Application: Medical, Flow Cytometry-Based Cell Sorter Material: ZrO₂ SPT Material Code : Z Weight [g]: 0.064 Tolerance [mm]: ± 0.003 Special Characteristics: High precision orifice</p>
	<p>Ceramic Micro Inkjet Nozzle</p> <p>Application: Industrial Inkjet Device Material: Al₂O₃ 99.9% SPT Material Code : C Weight [g]: 0.009 Tolerance [mm]: ± 0.005 Special Characteristics: Ø 0.03mm orifice</p>
	<p>Ceramic Capillary With High Precision Face Geometry</p> <p>Application: Chip Bonding Tool, Electronic Industry Material: Al₂O₃ / ZrO₂ SPT Material Code : AZ Weight [g]: 0.061 Tolerance [mm]: ± 0.001 Special Characteristics: High precision face geometry</p>