

COLD FORMED LASER NOZZLES[†]

Precision Manufacturing Delivers Superior Performance



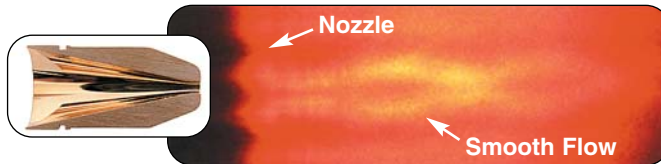
Cold formed nozzles are available for all leading laser cutters.

- Cold forming creates an even, continuous surface free of discontinuities for true, directed gas flow
- Cold formed interior geometries, and external profiles diamond machined to finished form
- Manufactured with 100 percent oxygen-free copper with better than 99.5 percent reflectivity
- Mirrored interior finish presents much less surface area – reducing the rate of oxidation or tarnish buildup
- Cold Formed Laser Nozzles[†] produce smoother edge quality with less exit dross

ULTRA-SMOOTH GAS FLOW



Schlieren image showing density gradients clearly identifies a Mach Disc (shock wave) present in the gas flow as it exits from a traditionally manufactured laser nozzle.



A Schlieren image of the gas flow as it exits from the same style nozzle, but manufactured using cold forming, shows clean, non-interrupted gas flow.

MIRROR FINISH



Laser nozzles manufactured using cold forming have a smooth, mirror-like finish for clean, non-interrupted gas flow.



Traditional manufacturing leaves imperfections on the internal surfaces of the nozzle resulting in turbulent gas flow.

EXCLUSIVE OFFER

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Cold Formed Laser Nozzles

What Is Cold Forming?

Cold forming is a process whereby pure Oxygen Free High Conductivity (OFHC) Copper is swaged around a Tungsten Carbide mandrel having the desired shape and surface finish of the final inside geometry of the nozzle – including the hole. All of the features of the mandrel are precisely transferred to the highly ductile Copper for exacting part-to-part reproducibility. This includes dimensional accuracy and surface finish characteristics. Rough, overall, exterior shapes are also formed by cold heading to save material. The final exterior contours are then formed on precision machines with diamond tools.

Cold Formed Precision

A highly exact manufacturing process, cold forming delivers unmatched tip-to-tip repeatability. In fact, the interior form is within 1 micron from one part to the next. This is due to precise conformation to the contours of the mandrel used to form the tip. The result is an ultra-smooth surface finish on critical interior surfaces of less than .007 microns (3 micro inch) RMS and overall exterior tolerances of +/- 50 microns (.002 inch).

Cold Formed Technology

The smoother surfaces produced through the cold formed manufacturing process provide for better laminar flow through the nozzle. This allows more precise optimization of the process gas consumption, tip standoff and cutting speed.

Also, the OFHC Copper used in cold forming has several percent higher reflectivity to CO₂ and YAG wavelengths than free machining Tellurium Copper used for conventionally machined nozzles (99.8% vs. 97.5%). This reduces or even eliminates damage from misaligned laser beams or workpiece reflections striking the nozzle.

Unlike Tellurium Copper, OFHC Copper can be easily polished to achieve very shiny, smooth

surfaces on the outside of the nozzle – reducing adhesion of cutting residues. This eliminates the need for the expensive Chrome plating used in conventional nozzle manufacturing to smooth out the surface.

Cold forming also permits nozzle interiors to be easily made with modified DeLeval contours – where the hole is shaped like a horn rather than a cylinder. This allows for new processes such as Oxy-Laser cutting of thick plate and Supersonic clean cutting of stainless steels and aluminum with specially designed tips and heads.

Cold Formed Cost

Cold formed nozzles currently cost slightly more than conventionally machined nozzles but have many cost reducing performance advantages. Cold formed nozzles tend to last longer, have reduced setup at change time, and most importantly, allow laser cutters to run closer to their optimum performance speeds and cut qualities with somewhat reduced process gas consumption. Taken together, cost savings can add up to hundreds or even thousands of dollars of extra productivity per nozzle life. All this for only a few extra dollars cost for the cold formed nozzle above the conventional tip. The trade off of a few dollars for a return of hundreds or perhaps thousands of dollars is easily justified with very simple mathematics.

Cold Formed Advantage

- Last longer
- Reduce setup time
- Can reject splatter
- Optimize cutting speed
- Optimize edge quality
- Reduce gas consumption
- Enable new cutting methods
- Increase profits per machine