



Medical Murray

Medical Product and Equipment Engineering Services

Medical Murray Catheter Experiences.

Nanomolding

- Mold tips directly to catheter shaft reduces need for extrusion and post processing to generate desired tip shape.
- Bonding multiple tubes of different configurations, such as single lumen to double lumen or transitioning one size to another.

Braiding

- We have experience varying braid pic count along the length of the catheter, as well as building braided devices with variable diameters.
- We have experience forming multilumen tubes with braid on the outside or around one of the inner lumens.
- Our braider has the ability to braid 8, 12, 16, 24 or 48 strands. We have braided numerous materials, although most of our experience is with stainless steel, both flat and round with diameters as low as .0005". We have also braided silver plated copper wire (for electrical shielding), coated copper wires, and nitinol. We also have the capability to incorporate non-metal materials in the braid as well (such as polymer fibers or strands).

Winding

- Our winding experience is with flat and round stainless steel wire encapsulated in tubing.
- We have wound single and multifilar coils for incorporation into tubes.
- We have experience building high torque, high accuracy tubes with low rotational distortion for rotary drive applications using counter wound springs.

Materials

- We have built composite tubes with liner materials that consist primarily of etched PTFE. We have also used liners of HDPE, Nylon, PETG, PEEK, polyimide and Pebax.
- Outer jacket materials have primarily been various thermoplastic elastomers, but also nylon, LDPE, EVA and blends of materials for high-pressure applications or variable stiffness applications.

Design Capabilities

- Extended inner liner – we have built devices where we terminate the braid and allow the liner to extend beyond the braid. The segment beyond the braid could be for size reduction, reduced stiffness, etc.
- Variable stiffness can produced by either varying the braid angle or varying the outer jacket material. Our experience is that stiffness variation is most affected by jacket material. We have also used varied braid angle or pic count to optimize elongation vs. localized radial expansion properties.



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- Coils are very effective at producing tubes that resist collapse when bent around a small radius.
- We have combined coils and braids in the same device to take advantage of both properties.
- Incorporating markers – we have incorporated radiopaque markers (coils or bands) under and over the braid that are sandwiched between polymer layers.
- Integration of multiple designs of miniature electronics, both wired and wireless
- Soft tips using nanomolding or more traditional tipping techniques such as heat fusion of soft tubing extrusions.
- The majority of our experience with producing braided devices using methods that are optimized for peak performance. These methods produce devices that minimize or eliminate air pockets seen in co-extruded composite tubes that lead to reduced composite strength.
- For co-extruded tubes, which are lower cost and generally for higher production volumes, we perform the braiding and manage the co-extrusion process with one of our two primary extrusion vendors. We then develop secondary operations such as tipping, shaping, or attaching strain relief and luers as necessary.

Tolerances

- With thin wall assemblies, we have worked with finish production tolerances as low as +/- .001” on I.D. and +/- .0015” for O.D. dimensions.
- The actual tolerances depend upon dimensions of the tube. Smaller, thinner wall tubes are simpler to control than large, thick wall tubes.

Extrusion

- We currently work with 2 primary extrusion vendors that produce the majority of our tubing. They have the ability produce any thermoplastic materials we have requested with tight tolerances. We also currently work with at least 5 other extrusion vendors who possess specialized equipment and experience with specific materials or applications for our use.

For custom compounding, we use an outside compounder who supplies material to our extrusion vendors and directly to us for overmolding applications.