HandyTube
A STEEL PARTNERS COMPANY

APPLICATION NOTE

How Our Small Diameter Steel Tubing Achieves Precision and Durability in Medical Applications

As medical devices get smaller and more sophisticated, OEMs are challenged to integrate smaller, less expensive components into their equipment without compromising on quality and reliability. Small diameter tubing is an essential part of this miniaturization trend, and plays a critical role in a variety of medical applications—from portable diagnostic and monitoring equipment, to handheld endoscopic instruments. And as with their devices, OEMs and medical engineers demand quality and precision from their tubing.

At HandyTube, we offer high-quality, durable stainless steel tubing in small diameters. Using advanced manufacturing processes and equipment, we can achieve outer diameters (OD) of 0.02 inch (0.51 millimeters) and inner diameters (ID) of 0.005 inch (0.13 millimeters)—all with a smooth surface finish.

These capabilities, along with our many years of tubing experience, allow us to meet the medical industry's strict requirements, reduce the size of devices and advance patient care.

THE STAINLESS STEEL TUBE MANUFACTURING PROCESS

Longer, thinner medical tubing requires strong, durable materials to withstand pressure and mechanical stresses. That's why 300 series stainless steel alloys are commonly used to produce small diameter tubing—especially seamless coiled tubing. Not only can 300 series stainless steel stand up to corrosion, but it can also withstand high pressures and temperatures. Type 316 is very resistant to chemicals and intergranular corrosion (IGC), and it is particularly effective in environments with high chloride and saline content—making it a popular, cost-effective alloy for medical applications. In addition to 316 stainless steel, types 304 and MP35N—a nickel-cobalt base alloy—offer good corrosion resistance for medical use.

To produce small diameter stainless steel tubing with proper ID smoothness, manufacturers must have an effective drawing process. In a typical drawing method, tubing is pulled through a conical die with a floating plug in the ID. Both the die and plug determine the outer and inner diameters—yielding precise dimensions and a smooth surface finish.

Our proprietary processes enhance the floating plug method by drawing stainless steel in coil form. This results in consistently smooth, small IDs for pure media delivery and more reliable flow rates. We also support the ID further in the drawing process and hold tooling to more stringent requirements to achieve surface finishes as smooth as 20 Ra. In addition, a state-of-the-art laser confocal microscope inspects the ID for smoothness, scanning diameters down to 0.010 inch to provide a more in-depth, accurate profile.

Smaller tubes must exhibit tight tolerances to fit smaller devices, so whether you require light or heavy ODs, we can provide OD tolerances down to 0.017 inch (0.43 millimeters) and ID tolerances as small as 0.003 inch (0.10 millimeters). This capability helps facilitate additional fabrication steps like bending and forming, resulting in more consistent mechanical properties for the final product. This capability helps facilitate additional fabrication steps like bending and forming, resulting in more consistent mechanical properties for the final product.

A FULL-SERVICE PROVIDER FOR THE MEDICAL INDUSTRY

We produce small and ultra-small diameter tubing in straight and coiled lengths to exact standards to meet our medical customers' requirements. As a specialist in producing precision fabricated tubular and metal components, we can provide customized tempered tubing with just the right tensile strength. If modifications are necessary, we work with ISO 13485 certified vendors to help deliver the exact product you need.

We also offer many value-added services, such as:

- **Custom cut lengths:** from less than 1 inch up to 24 feet, including lengths outside the scope of many tubing manufacturers.
- **Chroma Clean I.D.®:** a proprietary cleaning process that removes oil, grease and other contaminants from the tubing interior.
- **Electropolishing:** available for both the OD and ID.
- **Surface protection:** advanced SilcoTek® coatings to improve durability and reliability.

Whether you need metal tubing to protect electrical wires or to transport oxygen, nitrogen, blood or medicine, we have the capabilities and expertise to give you dimensionally precise, safe and functional metal tubing that meets your specific material and mechanical properties.

For more information, visit www.handytube.com.