

Catheter Coatings Benefit from UV Curing

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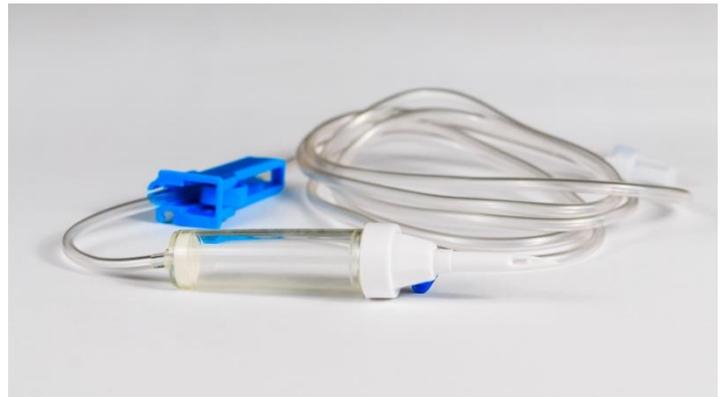
The medical device market remains strong and its resistance to economic recessions due to several long-term trends:

- Aging populations
- Increased life expectancy worldwide
- Technology is improving quality and length of life

Though the use of all medical devices is growing, the use of catheters is increasing at a faster pace due to an increase in non-invasive and Arthroscopic surgeries.

What are Catheters?

Catheters are tubular medical devices that are inserted into a patient to deliver drugs or fluids, view problems in a non-invasive way, open clogged arteries, deliver stents, or take out substances. As a result, catheters have become the doctors' or medical practitioners' highway through the body. Catheters can be made of metal (usually a Nitinol Alloy) or glass, but the substrate of choice in today's market is usually plastic or a plastic-metal combination.



Why coat a catheter?

Catheters are flexible but tend to have a low surface coefficient, which tends to inhibit transport through the body's highway system of veins and arteries. Coating a catheter with a hydrophilic coating allows the catheter to easily travel through the body. When the coating comes in contact with blood or other body fluid the coating becomes very slippery or "jelly-like". The coating can also inhibit blood coagulation. Since the coating is very thin, little additional thickness is added to the catheter tube diameter.

Why UV Coatings?

Many UV-curable catheter coatings are available today. Since most catheters are made of plastic with low mass and narrow diameters they tend to be very sensitive to heat. UV curing is a low temperature process that won't damage heat sensitive plastics. Also, UV curing provides instant cure and low VOC's, two benefits preferred by medical device manufacturers.

The Preferred UV Curing System

Savvy medical device manufacturers know that not all UV curing equipment is alike. Most manufacturers spend a good deal of time and money getting their device qualified and FDA approved. Manufacturers choosing inferior UV curing equipment learn too late that the equipment they chose to use during the qualification process is not reliable and consistent enough for high quality industrial production. Heraeus Noblelight has spent over forty years perfecting our microwave-powered UV curing systems. Because they are microwave-powered and because we manufacture our own bulbs to the highest quality standards, our UV curing systems provide the longest life and stable output*. This stable output ensures adequate cure every time. The long life of the system and components, including the longest warranties in the industry, reduce the manufacturer's total cost of ownership.

While all UV curing processes are low temperature compared to thermal processes, microwave-powered bulbs generate less heat than mercury arc type bulbs. The heat generated in a UV curing system is due primarily to the infrared (IR) heat given off by the quartz bulb. The less surface area the bulb has, the less IR heat it will emit. Most mercury arc type bulbs are 25mm in diameter, whereas Heraeus Noblelight's microwave-powered bulbs are only 13mm in diameter, offering a significant reduction in surface area and thus IR heat. Many catheter coating applications also use dichroic reflectors, reflectors with a special coating which reflects the UV energy but absorbs the IR energy, to reduce the heat output during curing.

Typical UV Processing

Plastic catheters usually need pretreatment, such as plasma surface-treaters, for proper wetting. Typically the catheter coating is applied via dip coating and then the catheter is UV cured in a stationary mode. A typical UV curing process for catheter coatings takes from 10-40 seconds or more. Heraeus Noblelight's microwave technology has the ability to start quickly without using shutters. Most mercury arc type UV curing systems must use a shutter because of the bulb's long restart times, which can create enormous amounts of heat.

* Life test data is available showing stability of output. Heraeus Noblelight microwave-powered UV bulb warranties are as long as 8,000 hours.

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