Medical and Optical Coating Viscosity Control: Lessons Learned

Michael D'Alelio

To ensure the effectiveness of a medical device, correct film thickness is crucial for optical and medical coatings. If film thickness is compromised, the medical device will not interact properly with a patient's body. Accordingly, viscosity is needed to maintain preferred film thickness. Cambridge Viscosity, a provider of automated viscometers, offers seven pieces of advice when utilizing viscometers.

Uniform film thickness is essential for effective optical and medical coatings. If the film thickness on a medical device is not correct, the product will not interact properly with the body. If an optical film is too thin, its product efficacy is impaired. If it is too heavy, visual performance is frequently compromised. Viscosity is critical for maintaining desired film thickness. As the preferred viscometer supplier for many medical and optical coatings worldwide, Cambridge Viscosity [1] has identified seven critical factors for optimal performance.

1. **Achieving proper film thickness is critical for coating success.** Incorrect film thickness results in unusable end products, varying from the distortion of optical characteristics to unacceptable in-vivo interactions. Incorrectly coated items are typically scrapped, along with the coatings themselves, which incurs costs such as the recovery costs for any volatile organic compounds evaporated in the process.
2. **Viscosity is an excellent indicator of coating solids and film thickness.** The concentration of coating molecules in the fluid directly affects its resistance to flow. Viscosity is an excellent indicator of the amount of solids in the fluid and in the resulting film. An alternative to in-process monitoring is destructive testing, which results in scrap from the test and off-spec production between tests.
3. **Controlling temperature is necessary for accurate viscosity measurements.** Temperature significantly influences viscosity. Temperature control typically includes insulation on the pipe sections, as well as water-jackets or heaters on the sensors plus the use of temperature-compensated viscosity to mathematically remove any minor temperature-variations.
4. **Small sample viscometers are essential.** Fluid volumes in medical and optical coating systems are small. 4-5 liters of coating is typical for the entire fluid system including the reservoir, pump, dip tank, and filter, along with the associated tubing. Any required sample conditioning is simpler with smaller amounts of fluid.

5. **Viscometers must be accurate in fluid viscosities of 200 cp or less.** Medical and optical coating viscosity is typically in this range. Sensors must be accurate and repeatable, while possessing excellent calibration stability in the 1-200 cp range. Oscillating piston technology is more advanced than torsional or vibrational sensors in these applications.
6. **Incorporate viscometers that are easy to install and use.** Since the viscometer is integrated into the process system, it should not only be compact, but it should also utilize materials that are compatible with the fluid being measured, self-cleaning, and inherently low maintenance (no moving seals, linkages, or surfaces for evaporation). These viscometers must also have the necessary approvals for hazardous locations, including ATEX and FM.
7. **Utilize the same technology for in-line process and lab viscometers.** Doing so facilitates analysis of process results and simplifies trouble-shooting for any special condition that might occur.

About Cambridge Viscosity
Cambridge Viscosity is the leading supplier of viscometers for optical and medical coatings worldwide. The company is inherently well suited to meet medical and optical requirements. Cambridge lab and process viscometers use the same core technology and are fully compliant with ASTM D7483. Cambridge instruments are compact, require small amounts of sample, incorporate temperature sensors, and are extremely accurate, repeatable, and robust. Overall, the instruments have proved to be reliable devices for medical and optical coating control.

Michael D'Alelio *is a Global Marketing professional at Cambridge Viscosity. He is responsible for website development, press releases, articles, and whitepapers. He can be reached at 339-674-9151 or* info@cambridgeviscosity.com *[2].*

Links:
[1] http://www.cambridgeviscosity.com
[2] mailto:info@cambridgeviscosity.com