12 Things To Consider When Choosing a Polymer for your Medical Device

1. **Environment** - Environment is the most critical factor for selecting a polymer for a medical device. Things to consider include temperature range during shipping, storage and product use; whether it will be in constant contact with human skin or tissue (and whether that tissue will be compromised), exposure to moisture, or exposure to other chemicals / materials and types of mechanical stresses on the component.

2. **Chemical Resistance –** As is the case with many materials, not all polymers bond or react well with each other or with other materials. Some polymers can withstand high levels of chemical exposure without breaking down, while others may react with slight exposure to other chemicals.

3. **Durability –** A concern that many have when choosing materials for a medical device is its versatility and compatibility with the intended end use of your product. Polymer products are known for their versatility and can be made to be single-use or multi-use. Be sure to discuss the end use of the product or component with your manufacturer. They can suggest different polymer blends, or coatings or covering materials to best suit your specific needs. For example, there are many materials that work well with polymers to help withstand torque and friction. Polymers themselves, in general, withstand compression and impact well.

4. **Biocompatibility –** Polymers can be made to be chemically inert. That is, if one is placed internally or directly on the skin, the device would not attack cells or cause an adverse physical reaction. Some polymers can cause irritation with the skin. It is important to discuss the need for biocompatibility with your manufacturer to ensure that your end product is fully biocompatible and will not cause any adverse side effects or irritation to the skin. A good way to test biocompatibility is to ask the manufacturer whether the material passes the ISO 10993 Part V Invitro Cytotoxicity test. The test can be done through Agar Diffusion. This is typically a good indicator of whether the material will pass stringent biocompatibility standards.

5. **Appearance –** Polymeric appearances can be multifaceted. While most polymers are easily colorable, they can also be made to be up to 100% optically clear. Polymers can be customized to your specific needs and preferences. Many can even be scented.

6. **Feel –** Though not very “scientific”, a basis often used to determine the correct polymer for a medical device or component is the feel or haptics of the polymer. Be sure to use a lot of descriptive words with your manufacturer so that the correct material can be used. Things to consider are a slick, or oily feeling, grip, tack, compression load deflection, immersion and durometer.

7. **Sterilization –** Polymers can be sterilized in a multitude of ways without compromising their integrity; therefore, they are able to meet the multifaceted needs of the medical community. Autoclave heat sterilization, chemical sterilization and UV sterilization are just some of the many

options available to ensure that the device or component is microbe free. Be sure to let your manufacturer know what form of sterilization your device will use.

8. **Molding –** Polymers are known for their moldability, in other words, it is possible to make extremely precise design tolerances when choosing a polymer for your medical device or component. Complex, intricate features can be effortlessly included in a product design when using polymers because they are easily moldable. Polymers can be molded through a variety of processes including injection molding, open casting, infusion, compression molding and thermoforming.

9. **Price –** With such a wide range of possibilities from a single polymer to blends, you will often have many options for a project based upon its financial specifications without compromising the performance quality. Be sure to be open with your manufacturer regarding price point, so that you can ensure that you choose the right polymer for your project. Many engineers will be able to find an affordable option to meet your needs.

10. **Weight –** Polymers can be made lightweight without compromising their strength. The weight of a polymer, with respect to its relative strength, remains high. While the aspect ratio of lightweight polymers is remarkable, fillers can be added to make a heavier and denser polymer if necessary.

11. **Recyclable / Green –** With concerns about global warming and protecting the environment, polymers can be a breath of fresh air if the appropriate one is chosen. They can be made out of biodegradable and renewable resources such as corn starch and soy plants instead of petroleum. Be sure to discuss this with your manufacturer so that you can ensure you choose the right material for your application.

12. **Compatibility –** We again visit the theme of versatility with the insurmountable range of projects that polymers can be used in conjunction with. Whether you need to combine polymers with film, fabric, foam or gel, the fact that polymers are easily compatible with many materials makes them perfect for a wide range of medical applications.