



Intelligent products enhance patients' quality of life

PLASTICS IN
THE MEDICAL
MARKET

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High-performance polymers have opened up many new options for technical equipment and dosing systems in modern medicine. Patients appreciate the safety and the comfort offered by high-tech administration devices made of featherweight plastics that permit them to take over responsibility for administering medication, thus enhancing their quality of life.

Two examples of a range of intelligent plastic products used in medical technology (MT) are dosing pens for self-administration by diabetics, and precision inhalers for asthma sufferers or high-pressure injections that administer vaccine or insulin painlessly through the skin without a needle. The plastic products' excellent suitability is demonstrated by their certified biocompatibility, their appropriateness for sterilization and also their resistance to chemicals and disinfectants.

Inhalers for asthma sufferers

Modern dosing systems enable patients to administer active substances safely and comfortably without the aid of a doctor. One example is the MDPI Novolizer® powder inhaler for asthma sufferers developed by Asta Medica. This Frankfurt company is now Sofotec GmbH, a subsidiary

of Zentaris AG. The name of the model explains how it functions: MDPI stands for "Multidose Dry Powder Inhaler." It is refillable, allows multiple accurate doses to be administered and is suitable for different active substances.

Components of the inhaler are made of polyoxymethylene (POM) natural and polybutylene terephthalate (PBT). In addition to their general suitability, the decisive criteria for selecting these two materials for applications in medical technology were their high dimensional stability and mechanical strength, even for the smallest wall thickness.

Product range for healthcare

The development of modern medical equipment is no longer conceivable without the use of engineering polymers. The spectrum of applications ranges from the above-mentioned dosing devices to instruments for minimal invasive surgery, to functional parts in diagnostic devices. Polymers, with nearly a 50 percent share, now represent the largest group of materials used in medical technology.

Plastics must fulfill a series of special requirements in the sensitive field of medical applications, including, for example, having excellent mechanical properties even in small and thin-walled parts. In many cases, they must be suitable for repeated sterilization in autoclaves.

Various materials and advantages

Various material properties are critical for use in medicine. There are different advantages that make a material suitable for a particular medical application:

- POM and PBT offer excellent slip/frictional properties, resistance to wear-and-tear, good resistance to hydrolysis and chemicals and outstanding long-term stability.

- Polyphenylene sulfide (PPS) is particularly suitable for functional parts with its extraordinary dimensional stability. In addition, it can be repeatedly sterilized in all known processes.



Orthotic components made of Ticona's GUR® UHMW-PE can be imprinted using common printing techniques.

- Liquid crystal polymer (LCP) exhibits a stable mechanical profile. It can be used to replace molded parts in medical devices and surgical instruments that have been made of light-metal alloys to date. These instruments can be subjected to repeated sterilization cycles as well without loss of their mechanical properties.

- Cyclic olefin copolymer (COC) reduces the risk of biocontamination, exhibits a glass-like clarity, and offers a high moisture barrier and shatter resistance. These properties make it advantageous to replace glass for diagnostic tubes.

- Ultra-high molecular weight polyethylene (UHMW-PE) offers exceptional impact strength, low wear, good slip properties and high stress cracking resistance — properties required for endoprostheses (artificial joints), orthopedic implants and orthoses. UHMW-PE also has biocompatibility in contact with skin, blood and tissue. UHMW-PE is used for the highly stressed socket and the joint head in artificial hip, knee and shoulder joints. ■



The sophisticated mechanism of the MDPI Novolizer® powder inhaler from Asta Medica (now Sofotec GmbH, a subsidiary of Zentaris AG) relies on functional parts made of Hostaform® (POM) type C 9021 TF natural and Celanex® (PBT) type 2002-2 green from Ticona.

Ticona, the technical polymers business of Celanese AG, is a leading global producer of engineering plastics headquartered in Summit, NJ, and Frankfurt, Germany. For more information on Ticona's range of polymers used in medical technology, visit its web site at www.ticona.com.