Banish those charges!

Many polymers are susceptible to electrostatic charging. An additive solves the problem.

The crackling in your hair when you take off a pullover made of synthetic fiber can be slightly disconcerting. But in industrial applications electrostatic charging of plastics has more serious consequences, including damage to components. Addition of TPU pellets eliminates the problem, giving materials longlasting antistatic properties. This additive is supplied as masterbatch, and is easy to process.

WHEN A POLYMER surface that is electrically neutral comes in contact with another surface and then is rapidly removed, it can become charged. Failure to dissipate this charge can result in uncontrolled sudden discharge. About a year ago, BASF introduced a new product into its TPU range: Elastostat antistatic TPU pellets. Elastostat is supplied in masterbatch form and so is easy to process. It belongs to the ›Elastostat‹ range of products, representing over 30 years of expertise from BASF Polyurethanes in the field of thermoplastic polyurethanes.

The antistatic impact of ›Elastostat‹ is permanent

Elastostat provides significant advantages over comparable solutions currently available: It can be used in a wide range of plastics and provides permanent anti-
Elastostat is supplied as masterbatch. These TPU pellets can be used in a wide variety of plastics to provide permanent antistatic properties. The product has good compatibility with standard plastics. And there is no requirement for special conditions – a particular humidity level for example. The material also has very good compatibility with standard plastics such as polyethylene (PE), polypropylene (PP), polystyrene (PS) and polyvinyl chloride (PVC).

The decisive parameter defining the electrostatic charging and discharge properties of a material is its surface resistivity. Official regulations in Germany use three terms to define electrostatic properties: conductive, dissipative, and insulating. Surface resistivity in conductive materials is below $10^6 \, \Omega$. These materials can dissipate charges rapidly, with the possibility of damage for example to sensitive electronic components.

The surface resistivity of insulating materials is above $10^{12} \, \Omega$. Most plastics are insulators, so they can easily become electrostatically charged by friction. This very low conductivity means that charges remain on the surface for long periods, and charge levels of several thousand volts can accumulate.

Materials with surface resistivity between $10^5$ and $10^9 \, \Omega$ are termed electrostatically dissipative or IDPs (intrinsic dissipative polymers). The new antistatic additives operate within this area.

To avoid electrostatic charging of the material conveyed, tubes and hoses can be produced by adding Elastostat pellets.

**»Excellent antistatic properties are achieved by adding just 10%«**

Anja Oltmanns, Key Account Sales Manager, BASF Polyurethanes GmbH

The good compatibility of this TPU masterbatch with standard polymers – and its excellent antistatic impact – were clearly apparent as soon as the product was launched. Results are also now available showing the effect of various addition rates of Elastostat in specific high-usage plastics - PP and high- and low-density PE for example. Testing with low-density PE showed that material with excellent antistatic properties is produced by adding just 10 percent of Elastostat.

Even at this low level, addition of the TPU masterbatch reduces surface resistivity to a value well below $10^{11} \, \Omega$, with very little effect on the processing parameters and mechanical properties of the main polymer.
These specific properties make Elastostat particularly valuable in sectors like industrial packaging. When this is produced from polyolefins, antistatic properties are essential for transport of combustible liquids or fine powders.

Addition of this TPU masterbatch in extrusion processes can produce hoses or packaging films that avoid any electrostatic charging of the product conveyed. Elastostat is also used in IBCs (intermediate bulk containers). These are often used for industrial transport and mostly consist of an inner PE container, an outer tubular metal frame, and a pallet.

Weathering resistance tests

The first practical tests are now underway with IBCs using Elastostat for antistatic properties – and one of the factors of greatest interest to technologists here is the resistance of the material to weathering.

BASF has a continuous program of collaboration with users on further development and new applications for its Elastostat products: one result from recent tests is that Elastostat is also compatible with PVC.