Rubber Gets Bounced by Performance Plastics

by Angela Rodenburgh

If there's one thing humans like to do, it's strive for the next best thing to make life easier or more comfortable. This has led to incredible innovations and the enhancement of existing products. Plastic and rubber are no exception.

Rubber has reportedly been in use since 1525 as elasticized balls and throughout time has seen many transformations and advancements such as the eraser, tubing and clothing.

Over time, the properties of rubber began to discourage users of rubber-made products. Cold weather makes them brittle and the sun causes them to gum together. However, in 1839 with Charles Goodyear's invention of vulcanization, rubber products became suitable for both hot and cold environments.

It was the Second World War, and the increased demand for rubber components, that led to the industrial scale development of synthetic rubber that drove many of the advancements seen today. Today's rubber is likely to be made artificially, synthesized from petroleum and combined with other minerals, largely because the planet can't produce enough natural rubber to meet all of our needs.

Today's performance plastics are rather young in comparison with the first plastic, nitrocellulose (branded Parkesine), created by Alexander Parkes in 1862 from cellulose treated with nitric acid and a solvent. Bakelite, the first fully synthetic plastic, was invented in 1907 and, like rubber, it was the Great Wars and the push for component advancement that led chemists to experiment with various additives and technologies to make different kinds of plastics.

In those early years, rubber and plastics were used for some common purposes. In fact, Parkesine was originally marketed and sold as a less expensive substitute for rubber. However, as time has passed, the distinct benefits and purposes for rubber and plastic became more evident.

Like performance plastics, rubber has a wide range of classifications but is most commonly divided into two groups: natural (India rubber or caoutchouc) and synthetic. Currently, 70 percent of all rubber in use is synthetic, which may come as a surprise to those who assume rubber is a more "natural" and environmentally friendly material.

Redco™ polyurethane bearings.

While plastics and rubbers are made up of many nonrenewable materials, the truly biggest threat to the environment is the amount of waste both materials create from human consumption. Both industries have inventive ways to repurpose and recycle worn out parts. However, rubber crumb doesn't have a plethora of uses and more than half of used tires are simply burned for their fuel value.

More than half of discarded tires (an estimated 259 million annually) are burned for their fuel value, polluting the environment.

Other than how many more products and materials can be created from recycled plastics compared to rubber, there is a more compelling reason that makes performance plastics the more environmentally friendly choice of material. The main reason to choose performance plastics over rubber is simply because the parts created using plastics last much longer, equaling less waste. Performance plastics compare optimally against rubbers for a variety of other reasons as well.

Rubber and polyurethanes are similar in that they both are available in a variety of softer hardnesses or durometers. These two materials are most often compared side-by-side for a number of applications. Rubber is usually chosen when a softer material is required because, on average, rubber is about 15 durometer points softer than the softest polyurethane compound. Polyurethane is most often chosen for environments with heavy loads, impact or where chemicals and oils are present.

Redco™ polyurethane rollers.

The advantages of polyurethanes over rubber include:

- High abrasion resistance
- Superior load bearing capacity
- Colorability
- High cut- and tear-resistance
- Oil, ozone and radiation resistance
- Broader hardness range
- Castable nature
- Lower cost, low pressure tooling

Redco™ polyurethane sprockets.

Specific applications where performance plastics outlast and outperform rubber can be seen in a variety of industries and some significant switchovers are present within the industrial, automotive and aerospace sectors. Rubber bushings, bearings and rollers are replaced frequently with performance plastics due to their superior properties that result in much longer part life and less maintenance.

Although plastic and rubber have similar backgrounds, innovation, customer demands and technology have brought us superior properties and a more expansive selection of performance plastic materials. Rubber still has its place. However, in more demanding applications and to keep waste from our landfills, plastics are the optimal choice.

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