WHAT'S SO SPECIAL ABOUT POLYURETHANE

A Closer Look at the Molecular Structure of Polyurethane

Polyurethane (PU) is a molecule that includes many (poly) urethane segments. A urethane is a molecular structure, also called "carbamate," comprising nitrogen, carbon, hydrogen and two oxygen atoms. This molecular structure is very strong yet versatile. Depending on the chemical used to help form the link between these segments, the urethane segment may bond on two, three, or many more other urethane segments. This variety means the formulation of polyurethane can be tuned to serve a particular purpose by controlling that branching factor and link type.

The Perfect Blend of the Properties Required

In formulating Zendura, one of the major engineering efforts was to balance both polar and nonpolar molecules in these other segments, which segregate into microdomains of "hard" and "soft." While in distinct phases, these hard and soft materials are strongly chemically bonded together by the urethane links. By combining hard and soft materials, Zendura achieves both high strength (from the hard materials) and high toughness (from the soft materials)!

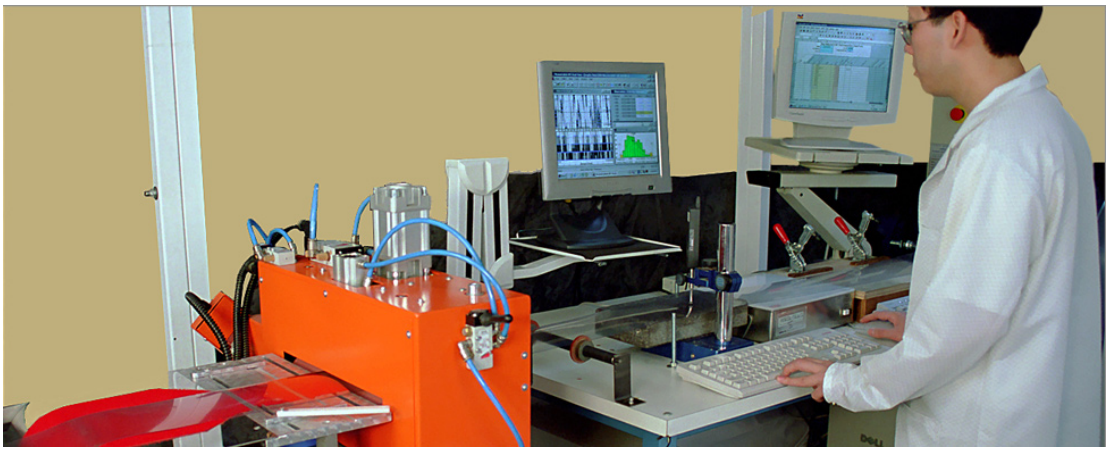
This natural strength of the urethane linkage, along with that branching flexibility, gives polyurethane the advantage over other commonly used resins such as polyethylene (PETG), polypropylene (PP) and copolyester, which are less capable in achieving the simultaneous toughness and strength.

For aligner applications, stress retention ensures that the aligner continuously moves the teeth (to its prescribed position) under applied force without losing its exact shape. For retainer applications, toughness is important as the appliance stays in patients' mouth for a much longer time (than aligners) and needs to hold the teeth in position while withstanding regular grinding, biting, and handling.

However polyurethane, like all materials, has limitations. Polyurethane is very sensitive to moisture during processing, has a higher melting point, and is harder to shape than many other plastics, and also requires an expensive base resin.

A Very Complex and Difficult Challenge

Managing these limitations was part of the challenge of engineering our Zendura products. It wasn't enough to design the materials alone. Precise manufacturing, high-moisture-barrier packaging, and special handling processes had to be developed, as well. Hence the reason our Zendura materials must be shipped in moisture-barrier bags. For the end-user, these limitations are why we recommend that our materials should be thermoformed within 15 mns of removing them from their moisture barrier foil bags and ideally should be thermoformed into an appliance using a positive-pressure thermoformer.



The Established Standard in Aligner and Retainer Materials

The additional cost of our Zendura materials and fabrication effort will be rewarded with the very best performing and most durable and reliable aligners and retainers available today. We invite orthodontists, dentists, and dental/orthodontic labs to test/trial our materials to see how they can put them to work today making money for them. They sell themselves.