



# Higher operating temperature UHMW-PE is no fairy tale

HIGH-TEMPERATURE  
ENGINEERING  
PLASTICS

by Ron Denoo

**T**his one won't work – the operating environment is too hot. And this one won't work because it's too expensive. But this one, the higher operating temperature UHMW-PE, is just right.

Until recently, options for elevated temperature applications were limited to high operating temperature (300°F and higher) that were very expensive or typical engineering polymers that degraded quickly at elevated temperatures, leading users to ask, "Is it worth the additional cost and trade-off in terms of wear/surface characteristics to use a polymer material designed for a higher temperature environment than needed?" With the recent introduction of a higher operating temperature UHMW-PE product into the marketplace, the answer to that question is an emphatic "NO." Now, just like the fairy tale, there is a "just right" solution: a polymer designed to excel in chemical and thermo-cycling environments up to 275°F, with no loss in wear and surface characteristics ... and at an affordable price.

Even in manufacturing environments with temperatures under 200°F, there are a number of benefits to choosing polymer, particularly UHMW-PE, components. By eliminating metal on metal, noise levels are greatly reduced. In addition, polymer components weigh less than steel, reducing operating power requirements. Finally, UHMW-PE components exhibit superior release characteristics and resist abrasion, corrosion, chemicals and moisture. These benefits, however, don't hang around very long when the material is in a manufacturing environment where temperatures range up to 275°F. In fact, at these higher temperatures, standard UHMW-PE is subject to an increased oxidation rate, causing rapid material degradation.

Higher operating temperature UHMW-PE, on the other hand, is specifically formulated to combat the oxidation rate of the material at higher temperatures, thereby slowing material degradation and extending wear-life in chemical, elevated temperature and thermo-cycling environments. So, why choose this higher operating temperature material over an extremely high operating temperature material such as PTFE?

## Economics, performance drive material decisions

The decision about which material to use for components in a particular application is generally based almost equally on short- and long-term costs as well as performance. Whereas higher operating temperature UHMW-PE and PTFE exhibit some of the same properties, such as low coefficient of friction, there are also marked differences.

For starters, higher operating temperature UHMW-PE lasts five times longer than recycled PTFE. It also has significantly greater impact resistance than PTFE. In other words, components manufactured from higher operating temperature UHMW-PE will need to be replaced less often, resulting in reduced replacement costs and downtime.

Additional benefits of higher operating temperature UHMW-PE include lower density (less than half the weight of PTFE) so power requirements are less, zero moisture absorption and chemical resistance.

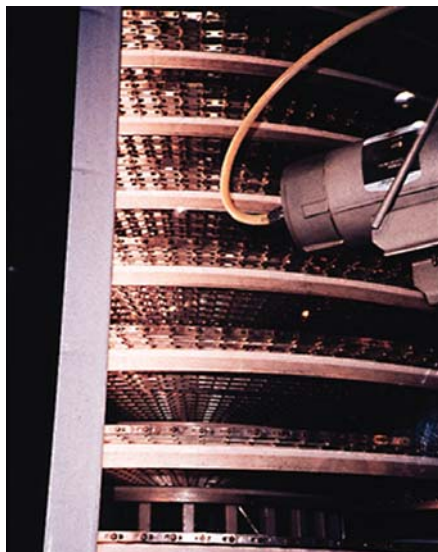
Finally, if the higher operating temperature UHMW-PE is also FDA and USDA compliant, it becomes the ideal material choice for wearstrips in proofing ovens or food dehydrators, as seals for chemical or medical processing equipment and as rollers and sprockets in food processing equipment.



Seals for processing equipment made from Quadrant Engineering Plastic Products' TIVAR® H.O.T. are used in food, chemical, medical and other industries.

## Defeating chemical, steam corrosion

Installing polymer wearstrips on both the send and return sides of a conveyor to protect the integrity of the original equipment and reduce noise levels has become more commonplace over the last few years within industries where conveyors are exposed to moisture and chemicals on a frequent basis. At one conveyor manufacturer, a UHMW-PE manufacturer installed wearstrips made from its higher operating temperature UHMW-PE on a conveyor inside a cleaning tunnel for transformers. As the transformers near completion, they go through an acid/steam wash to remove residue. Temperature in the tunnel is a consistent 250°F. Steel had previously been used in this area, but noise levels were high, as were replacement costs due to material deterioration from the moisture and chemicals.



TIVAR® H.O.T. J-leg wearstrips by Quadrant Engineering Plastic Products are used in proofing ovens or food dehydrators.

The higher operating temperature UHMW-PE wearstrips have eliminated both issues.

### ***Mixing paddles a sweet success***

Cleaning and sanitation is a high priority at any food processing facility and candy companies are no exception. In order to achieve government and corporate mandated sanitation standards, equipment is frequently cleaned with chemical-based solutions that can create a very harsh operating environment. One candy-maker cleans the kettles in which candy ingredients are mixed by putting dry citric acid and sodium hydroxide in the kettles and then adding water. The addition of the water causes a reaction that causes the mixture to heat up to 225°-230°F and become very corrosive. This cleaning mixture heavily impacts the kettles mixing paddles, causing them to split, crack and discolor. The company was forced to replace the paddles at least every eight weeks.

The UHMW-PE manufacturer replaced the paddles with ones manufactured from its patent-pending higher operating temperature UHMW-PE. After more than a year in use, the new paddles still showed no signs of wear or cracking.

### ***Bottom line results***

In the final analysis, higher operating temperature UHMW-PE economically bridges the gap between standard UHMW-PE and extremely high operating temperature polymers. Initial material investment costs are about one-third that of PTFE. And with the additional expense reductions previously mentioned, higher operating temperature UHMW-PE provides the kind of storybook ending with regard to financial considerations every company looks for.

*And they lived happily ever after with their higher operating temperature UHMW-PE components.* ■

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