

# Self-Healing Polymers with Shape Recovery

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## Technology description

### Reduces the need for hands-on repairs, saving time and money

These self-healing polymers spontaneously mend wear-related fissures and cracks to increase the lifespan of many different products, including components for airplanes and spacecraft. Traditionally, when an item such as a machined component showed signs of wear-and-tear, a human fixed or replaced it. Today's designers are working to reduce the need for hands-on repairs. Researchers at the University of Florida have developed self-healing polymers that make it possible to fix components by applying heat to the damaged area. Self-healing polymers are an attractive solution for making repairs at low cost, using only heat. Demand for self-healing polymers with shape memory is expected to increase in the near future as industries become more aware of the technology's many benefits.

## Technology

This self-healing polyurethane, which has shape memory properties, does not require the use of external forces (i.e., clamps) to close cracks in surfaces. It has the ability to return from a deformed or temporary shape to its original shape with the introduction of a stimulus, such as heat. If, for example, a machined component were to become damaged, the application of heat would induce the polymer to heal spontaneously. The polymer's polyurethane network provides a stable structure with advantageous mechanical properties.

## Application area

Self-healing polymers for use in a wide variety of products, including components on airplanes and spacecraft

## Advantages

Does not require external forces to heal cracks, making it useful in situations where component replacement is difficult or costly

Allows for large-scale polymer production, lowering costs

Can be used as a coating material for everyday applications, such as electronic products or automobile parts, maximizing versatility

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