Foam Adhesion

Adhesion is any attraction process between dissimilar molecular species that can potentially bring them in "direct contact" By contrast cohesion takes place between similar molecules.

Diffusive adhesion

Some materials may merge at the joint by diffusion. This may occur when the molecules of both materials are mobile and soluble in each other. This would be particularly effective with polymer chains where one end of the molecule diffuses into the other material. It is also the mechanism involved in sintering. When metal or ceramic powders are pressed together and heated, atoms diffuse from one particle to the next. This joins the particles into one.

Strength

The strength of the adhesion between two materials depends on which of the above mechanisms occur between the two materials, and the surface area over which the two materials contact. Materials that wet against each other tend to have a larger contact area than those that do not. Wetting depends on the surface energy of the materials.
Low surface energy materials such as polyethylene, polypropylene, Teflon, and Delrin are difficult to bond without special surface preparation.