

Adhesion problems

Most of the problems with adhesion are for metals deposited onto polymer webs. Polymer webs come in a variety of types from fluorinated ones such as polytetrafluoroethylene (PTFE) with a very low surface energy through polyethylene (PE), polypropylene (PP) and others to polyethylene terephthalate (PET) with a somewhat higher surface energy.

However none of these is ideal and it is common to use some form of surface treatment to increase the surface energy to as high a value as possible to make it easier for the metal to wet the surface and also possibly chemically bond with the surface to give increased adhesion.

Not only may the surface energy be low but also the surface may have been contaminated which may further reduce the surface energy. The contamination is most frequently in the form of a low molecular weight material. This material will not be well bonded to the bulk polymer and the metal, although stuck to the low molecular weight material, will not be well bonded to the bulk polymer. Hence the low molecular weight material governs the metal to polymer adhesion.

The low molecular weight material may be residual un-polymerised material in the form of oligomers or it may be from additives used to change the coefficient of friction enabling improved handling.

The surface treatment can remove or stabilise these low molecular weight species and in doing so improve the metal to polymer adhesion.