

Laser surface pre – treatment of polyolefin substrates for adhesive bonding

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Abstract. Adhesive bonding offers many advantages over mechanical fastening, but requires an accurate surface preparation, which is widely recognized as the key step to produce reliable and durable adhesive bonds. The use of laser cleaning processes is useful to increase the reactivity of the topmost layers of the substrates, without affecting the bulk material properties. These methods are usefully applied for treating polymers, which are generally characterized by high chemical inertia, very low surface energy values and, consequently, poor adhesive properties and this is particularly true for polyolefins. Furthermore laser treatment provides an alternative to the polluting and less accurate practices such as manual abrasion and primer. In this paper the effect of different laser pre-treatments on polypropylene (PP) and high density polyethylene (HDPE) substrates was studied, by surface roughness evaluation and single lap shear tests. As a comparison, untreated and primer treated specimens were also included in the experimental campaign. The results show that laser treatment significantly affected the substrates' surface and the mechanical properties of adhesive bonding joints. Finding the optimal combination of the working parameters it is possible to overcome the strength of untreated joints and the primer treated ones



FIGURE 1. Laser surface texturing

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