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Adhesive Bonding Properties and Characteristics of DP Steels

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Adhesive bonding is being increasingly used to join structural parts not only made from polymers, but also from metals. The automotive industry is a fine example of a mass production industrial field where adhesive bonding of steel parts are being used. The advantages of this joining technique include less energy consumption, since heating can be avoided or low temperatures can be used, and an extremely important consequence is that there are no microstructural changes of the adherents during the joining operation. The strength of an adhesive joint is, however, very dependent on manufacturing parameters, such as pressure and surface roughness, and also on the inherent characteristics of the adherent materials. In this respect, the surface energy of the adherents plays a key role and, therefore, even if the manufacturing parameters are held constant, the mechanical performance of the joints can be strongly modified. Steels of the so-called Dual Phase (DP) series are being largely used by the automotive industry and have already been used in adhesive joints. In this work, as a first step of a development program aimed to set the best manufacturing parameters for steel-to-steel and steel-to-polymer adhesive joints the contact angle between the DP steels series (600 and 780) and structural adhesive is determined as a function of the surface roughness of the steel adherents.