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In this work, an innovative technique for adhesive joint separation that combines the use of a hybrid-modified adhesive with microwave (MW) or induction heating (IH) [1-3] processes is presented. Graphene nanoplatelets (GnPs) and iron oxide particles were used to modify a thermoplastic adhesive, polyolefin hot-melt adhesive by mean of a twin-screw extruder. This thermoplastic adhesive, already used for bonding automotive applications, was modified with both iron oxide and GnPs in order to enhance the electrical properties and the sensitivity to MW and IH. The mechanical and electrical properties together with the sensitivity of the modified adhesives to microwave or induction heating processes are investigated. Single Lap Joint (SLJ) specimens were used to evaluate the mechanical properties of the pristine and the modified adhesive. The mechanical tests illustrate that the maximum loads of modified adhesives decrease slightly. Tests conducted with microwave and induction heating processes showed that these two systems are able to melt the modified adhesive. Thus, the separation of bonded joints is possible with both systems. The temperature increase of the induction heating system is found to be more rapid than the microwaves but the latter system is energetically more efficient. Scanning Electron Microscope (SEM) was used to measure the particle distribution and to evaluate the differences between the manual mixed mode and the tween extruder system as preliminary analysis.

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