Ref.: IIIn34-002

The clinching and spot welding of advanced high strengths dual-phase steel

Apresentador: Vanderlei Martins Bastos

Autores (Instituição): Bastos, V.M.(Instituto de Pesquisas Energéticas e Nucleares); Liermann, C.(Tox); Dalmazo, R.(Tox); Lara, J.A.(Instituto de pesquisas Energéticas e Nucleares); JESUS, E.R.(IFSP); Mucsi, C.S.(Instituto de Pesquisas Energéticas e Nucleares); Rossi, J.L.(Instituto de pesquisas Energéticas e Nucleares);

Resumo:
In lightweight construction, the lowest use of raw materials is a reality. In the automotive sector, the objective is the production of vehicle bodies following the concept of light construction and at the same time suitably rigid and resistant to collisions. In addition, the assumptions of reducing fuel consumption and the volume of vehicle emissions must be met. The materials for the automotive sector, the use of advanced dual-phase steel of 1.3 GPa of mechanical strengths, whose ferrite/martensite microstructure gives ultra-high tensile strength, can be spot welded by resistance and/or joined by clinching. The application of this steel, up to 1.50 mm thick, proves to be attractive to replace components obtained by hot stamping in the automotive sector, reducing the cost of industrializing components such as side protection bars, floor reinforcements and other relevant components in the system of vehicle collision management. The present work aimed to correlate aspects of clinching and resistance spot welding joints, regarding tensile strength. Changes in the clinching anchor region and in the heat-affected zone in the spot weld were evaluated in microstructural and microhardness terms. The loads observed during the peeling tests with clinching with complete neck rupture were higher than when the mechanical union uncoupling took place. As for spot welding, despite the drop in microhardness in the heat-affected zone and the shear in this region in the peeling test, the mechanical strength was still about twice as high as in clinching. Even though, the results allow one to conclude that, under the experimental conditions of the present work, clinching is feasible for ultra-high strength materials.