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Impact toughness of notched composite material jute/polyester

Djeghader Djamel[1,2] and **Redjel Bachir**[1]
[1]University of Badji Mokhtar, Algeria
[2]University of Mes Saddik Ben Yahia, Algeria

In recent years, the use of composite materials reinforced with natural fibers has been the subject of several studies to provide a possible replacement of ceramic reinforced in composite material. They are renewed, recyclable, less abrasive and lightweight. In this study, Impact Charpy tests were carried out on prismatic samples with lateral notches of different depths of a polyester matrix composite material, reinforced with three layers of bidirectional jute fibers corresponding to a rate of 40%. Three distances between supports were tested: 40 mm, 60 mm and 70 mm. The tests were performed in 3 points bending with an impact velocity of 3.85 m/s and a pendulum of 7.5 joules. The Williams method based on the principles of linear elastic fracture mechanics was used to interpret these results and yielded an estimate of the fracture energy and toughness GIC intrinsic parameter of this material from the total energy U dissipated during impact. The impact energy U measurement results according to BDϕ for all notched specimens tested for the three distances between support 3 used are characterized by a high dispersion of data points around the linear regression line. This dispersion characteristic of composite materials is a consequence mainly of the heterogeneity of the material in the path of the cracking and of the dispersion of the mechanical test itself. The impact toughness GIC decreases with increasing distance between supports.

djameldjeghader@yahoo.fr

Phenomenon of destabilization of the cementite in pearlitic steels and their influence on the development of high levels of mechanical strength

Elena Brandaleze and **Mykhaylo Romanyuka**
National Technological University, Argentina

In this paper the deformation mechanisms in steels with high carbon content (> 0.8% C) cold drawn studied. Plastic deformation phenomena promote dissolution of cementite in pearlite, achieving high strength and ductility. For this reason, these steels are used in critical applications such as cranes or support cables of suspension bridges. With the aim of studying the stability of iron carbides that impact in increasing the mechanical properties are tested to breaking twist, two wire samples processed under the same conditions. These have different behavior, one suffered fracture flat (normal) and another delaminated fracture. To this end, studies of optical and scanning electron microscopy (SEM) are made. In addition, assays differential thermal analysis (DTA/DSC) and applying thermodynamic simulation FactSage to evaluate the stability of carbides are made. The results show heterogeneity between the central and peripheral zone of both wires and the presence of the phenomenon of curling (curling). Both phenomena are more pronounced in the normal wire, for its greater plasticity. The phenomenon of precipitation of carbides epsilon carbon diffusion-perlite ferrite, interface justifying increased mechanical strength is identified.

mromanyuk@frsn.utn.edu.ar
ebrandaleze@frsn.utn.edu.ar

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