Experimental characterization of 316L nanocristallized multilayer structure

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In the present work, a new method combining surface nanocrystallisation treatment (SMAT) and the co-rolling process is presented. The aim of this duplex treatment is the development of a 316L stainless steel semi-massive multilayered bulk structure with improved yield and ultimate tensile strengths, while conserving an acceptable elongation to failure by optimizing the volume fraction and distribution of the nano-grains in the laminate. To characterize this composite structure, tensile and three point bending tests have been carried out. A special attention was granted to the inspection of the interface bonding quality of the co-rolled composite laminates. Furthermore, optical and electron microscope observations were carried out to determine the correlation between the mechanical response, the microstructure and the appearance of the interfaces.

Recent Publications

1. K. Lu, J. Lu, Surface nanocrystallization (Snc) of metallic materials - presentation of the concept behind a new approach, J. Mater. Sci. Technol. 15 (1999) 193-197.
2. K. Lu, J. Lu, Nanostructured surface layer on metallic materials induced by Surface Mechanical Attrition Treatment, Mater. Sci. Eng. A 375-377 (2004) 38-45.
3. T. Roland, D. Retraint, K. Lu, J. Lu: Generation of nanostructures on 316L stainless steel and its effect on mechanical behavior, Mater. Sci. Forum 490-491 (2005) 625-630.
4. D. Retraint, Effect of a superficial nanostructured layer on the mechanical properties of metallic parts, Matériaux & Techniques 99 (2011) 101-104.
5. L. Waltz, P. Kanouté, D. Retraint, "Mechanical characterization of a SMATed 316L stainless steel: use of cyclic nanoindentation", European Congress on Advanced Materials and Processes (Euromat 2011), Montpellier, 12-15 September 2011.
6. D. Retraint, Z. Quadir, W. Xu, L. Waltz, M. Ferry, "Microstructural investigation of roll bonded nanocrystalline stainless steel sheets", The 16th International Conference on the Textures of Materials (ICOTOM 16), Bombay (India), 12-17 December 2011.



Biography

After getting an engineer diploma in mechanical engineering and a master of science from the High Institute of Aeronautics and Space in Toulouse (France), Laurent Waltz started a PhD thesis on the development of nanocrystallized structures presenting high mechanical strength at the University of Technology of Troyes. He is currently associate professor at the Laboratory of Mechanics and Civil Engineering of Montpellier University where he works on the characterization of materials with gradient properties using optical means.

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Notes/Comments: