Title: A Novel Method for Fabricating Multilayered Steels

Authors: Rama Satya Sandilya V., P.K. Rai, S. Shekhar, S. Sangal, K. Mondal

PII: S0924-0136(17)30530-7
DOI: https://doi.org/10.1016/j.jmatprotec.2017.11.017
Reference: PROTEC 15491

To appear in: *Journal of Materials Processing Technology*

Received date: 18-9-2017
Revised date: 5-11-2017
Accepted date: 11-11-2017

Please cite this article as: Sandilya V., Rama Satya, Rai, P.K., Shekhar, S., Sangal, S., Mondal, K., A Novel Method for Fabricating Multilayered Steels.Journal of Materials Processing Technology https://doi.org/10.1016/j.jmatprotec.2017.11.017

A Novel Method for Fabricating Multilayered Steels

Rama Satya Sandilya V., P.K. Rai, S. Shekhar, S. Sangal and K. Mondal*

Department of Materials Science and Engineering,

Indian Institute of Technology Kanpur, Uttar Pradesh 208016, India

*Corresponding Author: Email id – kallol@iitk.ac.in

Phone: +915122596156; Fax: +915122597505

Abstract

A novel method of producing multilayered steels (MLS) with harmonically variable composition was developed by stacking the requisite number of layers, drilling uniform holes into the stacked assembly, inserting high strength rods of a suitable diameter into the holes, hammering to interlock the multiple layers to finally form a multilayer preform. The preform was then subjected to severe plastic deformation processes, like cold forging, cold and/or hot rolling to obtain the final multi-layered product. High Carbon (H), Medium Carbon (M), Low Carbon (LC, L), Stainless steel (SS) sheets and Cr powder were chosen as the stacking materials and various stacking sequences were prepared. The interface between different layers showed strong diffusion bonding with very little or no presence of voids/pores suggesting excellent union. Compositional analysis showed alternate distribution of constituent elements across different layers of steels in different combination of multi-layered products. Flexure test of the SS-LC multilayer showed that the crack initiated due to early failure of SS layer was inhibited from growing due to the energy absorbing tendency of the LC steel on either side of the SS layer. Hardness and tensile properties of multi-layered steels depended on the different alternate combinations of various materials.