World Academy of Science, Engineering and Technology
International Journal of Mechanical and Mechatronics Engineering
Vol:9, No:03, 2015

Assessment of Residual Stress on HDPE Pipe Wall Thickness

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Abstract : Residual stresses, in high-density polyethylene (HDPE) pipes, result from a nonhomogeneous cooling rate that occurs between the inner and outer surfaces during the extrusion process in manufacture. Most known methods of measurements to determine the magnitude and profile of the residual stresses in the pipe wall thickness are layer removal and ring slitting method. The combined layer removal and ring slitting methods described in this paper involves measurement of the circumferential residual stresses with minimal local disturbance. The existing methods used for pipe geometry (ring slitting method) gives a single residual stress value at the bore. The layer removal method which is used more in flat plate specimen is implemented with ring slitting method. The method permits stress measurements to be made directly at different depth in the pipe wall and a well-defined residual stress profile was consequently obtained.

Keywords : residual stress, layer removal, ring splitting, HDPE, wall thickness
Conference Title : ICMEM 2015 : International Conference on Mechanical Engineering and Mechatronics
Conference Location : Prague, Czechia
Conference Dates : March 23-24, 2015

Open Science Index, Mechanical and Mechatronics Engineering Vol:9, No:03, 2015 publications.waset.org/abstracts/25357.pdf