Acoustoelastic evaluation of OCTG pipe welded casing type API 5CT N80Q

M. A. C. Fonseca[1], M. S. Q. Bittencourt[1], J. C. Payão Filho[2]
e-mail: manoel@ien.gov.br

[1] *Division of Nuclear Engineering - IEN*
[2] *Department of Metallurgical Engineering and Materials - COPPE/UFRJ*

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This paper presents an acoustoelastic evaluation of an OCTG API 5CT N80Q casing pipe welded by the ERW/HFIW process. The ultrasonic technique of acoustic birefringence was employed to evaluate the acoustoelastic behavior of the T-380 CSN steel plate used to manufacture the pipe under study (Figure 1), and the acoustoelastic behavior of the pipe itself before subjected to the heat treatment of quench tempering and after subjected to hot straightening [1].

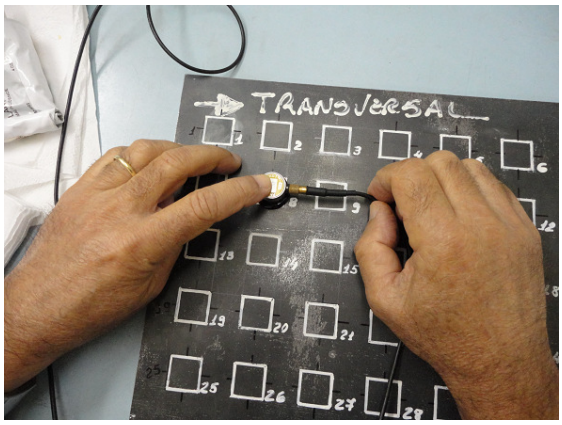

Figure 1 - Test specimen taken from the steel coil being inspected ultrasonically

It was observed a reduction in the level of anisotropy after these two manufacturing steps, what shows the efficacy of the heat treatment of quench tempering and hot straightening. After the hot straightening step, a test specimen was extracted from the pipe containing at its center the circumferential area of inspection under evaluation, which was subjected to a milling cutting operation along the weld. The opening of specimen after cutting indicated that the residual circumferential stress in the pipe was tensile. A comparison between the acoustoelastic states of the pipe after the hot straightening and the cutting operations indicated a 63% reduction in the level of anisotropy after the latter operation (Figure 2).

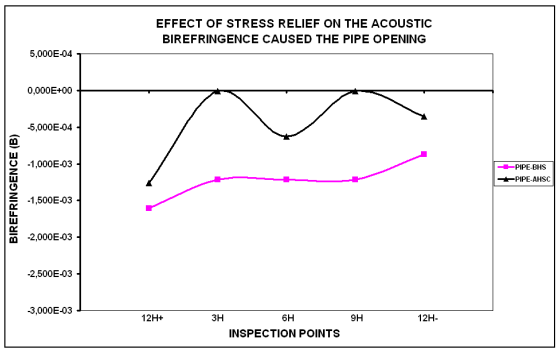

Figure 2 - Effect of stress relief on the acoustic birrefringence caused the pipe opening (before hot straightening -PIPE-BHS and after hot straightening and cutting -PIPE-AHSC).

References:

[1] FONSECA, M. A. C. **Avaliação acustoelástica de tubos OCTG do tipo casing API 5CT grau N80Q soldados com o processo ERW/HFIW**. 2012. 118f. Dissertação (Mestrado em Engenharia Metalúrgica e de Materiais) – Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2012. (Co-Orientador: Marcelo S. Q. Bittencourt).