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Sébastien JEGOU, Laurent BARRALLIER - Determination of residual stress in nitrided steels with transmission angle-dispersive diffraction - 2014

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**Title:** Determination of residual stress in nitrided steels with transmission angle-dispersive diffraction.

**Key words:** Nitriding, residual stresses, iron alloys, precipitation

**Abstract:** Residual stress analysis with transmission angle-dispersive diffraction is carried out on nitrided steels. It aims evaluating residual stresses within the ferritic matrix but also within secondary phases such as nano-scale nitrides and polycrystalline cementite. Samples of various alloying elements contents are investigated. Results are compared to laboratory X-ray diffraction and micromechanical modeling of gas nitriding of steels.