Effect of Plastic Pre-straining on Residual Stress and Composition Profiles in Low-Temperature Surface-Hardened Austenitic Stainless Steel

The present work deals with the evaluation of the residual stress profiles in expanded austenite by applying grazing incidence X-ray diffraction (GI-XRD) combined with successive sublayer removal. Annealed and deformed (\(\varepsilon_{eq}=0.5\)) samples of stable stainless steel EN 1.4369 were nitrided or nitrocarburized. The residual stress profiles resulting from the thermochemical low-temperature surface treatment were measured. The results indicate high-residual compressive stresses of several GPa's in the nitried region, while lower-compressive stresses are produced in the carburized case. Plastic deformation in the steel prior to thermochemical treatment has a hardly measurable influence on the nitrogen-rich zone, while it has a measurable effect on the stresses and depth of the carbon-rich zone.

General information
State: Published
Organisations: Department of Mechanical Engineering, Materials and Surface Engineering
Contributors: Bottoli, F., Christiansen, T. L., Winther, G., Somers, M. A. J.
Pages: 4001–4011
Publication date: 2016
Peer-reviewed: Yes

Publication information
Volume: 47
Issue number: 8
ISSN (Print): 1073-5623
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.08 SJR 1.093 SNIP 1.28
Web of Science (2017): Impact factor 1.887
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.91 SJR 1.206 SNIP 1.336
Web of Science (2016): Impact factor 1.874
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 1.78 SJR 1.267 SNIP 1.407
Web of Science (2015): Impact factor 1.749
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.06 SJR 1.659 SNIP 1.848
Web of Science (2014): Impact factor 1.73
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 1.9 SJR 1.513 SNIP 1.656
Web of Science (2013): Impact factor 1.73
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 1.76 SJR 1.426 SNIP 1.75
Web of Science (2012): Impact factor 1.627
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 1.78 SJR 1.498 SNIP 1.721
Web of Science (2011): Impact factor 1.545