A martensitic gear steel (18CrNiMo7-6) was annealed at 180 degrees C for 2h and at similar to 750 degrees C for 1h to design two different starting microstructures for shot peening. One maintains the original as-transformed martensite while the other contains irregular-shaped sorbite together with ferrite. These two materials were shot peened using two different peening conditions. The softer sorbite + ferrite microstructure was shot peened using 0.6 mm conditioned cut steel shots at an average speed of 25 m/s in a conventional shot peening machine, while the harder tempered martensite steel was shot peened using 1.5 mm steel shots at a speed of 50 m/s in an in-house developed shot peening machine. The shot speeds in the conventional shot peening machine were measured using an in-house lidar set-up. The microstructure of each sample was characterized by optical and scanning electron microscopy, and the mechanical properties examined by microhardness and tensile testing. The residual stresses were measured using an Xstress 3000 G2R diffractometer equipped with a Cr K alpha x-ray source. The correspondence between the residual stress profile and the gradient structure produced by shot peening, and the relationship between the microstructure and strength, are analyzed and discussed.

General information
Publication status: Published
Organisations: Department of Mechanical Engineering, Department of Wind Energy, Manufacturing Engineering, Materials science and characterization, Meteorology & Remote Sensing, Composites Mechanics and Materials Mechanics, Materials and Surface Engineering, Chongqing University, Chalmers University of Technology, Nanjing University of Science and Technology
Number of pages: 7
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: I O P Conference Series: Materials Science and Engineering
Volume: 219
ISSN (Print): 1757-8981
Ratings:
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 0.49 SJR 0.201 SNIP 0.618
Web of Science (2017): Indexed yes
Original language: English
Keywords: MATERIALS, GRAIN-SIZE
Electronic versions:
DOIs:
10.1088/1757-899X/219/1/012046
Source: FindIt
Source ID: 2392030897
Research output: Contribution to journal › Journal article – Annual report year: 2017 › Research › peer-review