Detection of the onset of galling in strip reduction testing using acoustic emission

Galling is an important issue in metal forming of tribologically severe materials such as high strength steel, stainless steel, Al- or Ti-alloys, since it leads to poor surface quality of the formed components, production stops and possibly deterioration of tools. The onset of galling is difficult to detect, since it is either based on the operator's personal judgement or indirect measuring techniques. The application of acoustic emission measuring technique for characterization of onset of galling in sheet metal forming is discussed in the presented paper. The strip reduction test, which emulates the ironing process, has been examined in order to evaluate onset of galling and how this is related to the generated acoustic emission parameters. Preliminary investigations have shown that differences can be found in the acoustic emission signal parameters depending on the frictional conditions between the tool and the workpiece surfaces. A correlation to the severity of galling is found. This is inspected through observations of tested workpiece surfaces in SEM and measurements of the surface roughness. The acoustic emission measuring technique is found to possess promising aspects for online monitoring of galling in metal forming processes.

General information
State: Published
Organisations: Department of Mechanical Engineering, Manufacturing Engineering
Contributors: Moghadam, M., Christiansen, P., Bay, N. O.
Pages: 59–64
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Procedia Engineering
Volume: 183
ISSN (Print): 1877-7058
Ratings:
Scopus rating (2017): CiteScore 0.89
Web of Science (2017): Indexed yes
Scopus rating (2016): CiteScore 0.74
Scopus rating (2015): CiteScore 0.56
Scopus rating (2014): CiteScore 0.53
Scopus rating (2013): CiteScore 0.4
ISI indexed (2013): ISI indexed no
Scopus rating (2012): CiteScore 0.28
ISI indexed (2012): ISI indexed no
Scopus rating (2011): CiteScore 0.45
ISI indexed (2011): ISI indexed no
Web of Science (2010): Indexed yes
Original language: English
Keywords: Acoustic emission, Strip reduction testing, Galling, Surface roughness, Online monitoring
Electronic versions: 1_s2.0_S1877705817315163_main.pdf
DOIs: 10.1016/j.proeng.2017.04.011
Research output: Research - peer-review > Conference article – Annual report year: 2017