

IFAC-PapersOnLine

Volume 48, Issue 17, 2015, Pages 69–73

4th IFAC Workshop on Mining, Mineral and Metal Processing MMM
2015 — Oulu, Finland, 25–27 August 2015

Stress monitoring of Underground Load Haul Dumper Front Axle with Intelligent Indices

Antti H. Koistinen, Esko K. Juuso

[Show more](#)

doi:10.1016/j.ifacol.2015.10.080

[Get rights and content](#)

Abstract

Maintenance of mining machinery is done by schedule or in the event of break down and this is area where it is possible to cut down in maintenance costs by lowering down time and preventing sudden break downs. Advanced on site signal processing enables early fault detection and improves maintenance planning by optimizing service intervals. This paper studies the stress affecting the load haul dumper front axle. Methods used are stress indices and cumulative stress analysis.

Keywords

Signal processing; nonlinear scaling; intelligent stress indices; vibration analysis; l_p norms

[Download full text in PDF](#)

References

- [Boyer et al., 1986](#) Boyer, H.E. (1986). Atlas of fatigue curves, ASM International, 518 pp.
- [Bathias, 1999](#) C. Bathias
There is no infinite fatigue life in metallic materials
Fatigue & Fracture of Engineering Materials & Structures, 22 (7) (1999), pp. 559–565
[View Record in Scopus](#) | [Full Text via CrossRef](#) | [Citing articles \(249\)](#)
- [Collacott, 1977](#) R.A. Collacott
Mechanical fault diagnosis and condition monitoring, Chapman and Hall, Chapman and Hall (1977)
- [Dhillon, 2008](#) B.S. Dhillon
Mining equipment reliability, maintainability, and safety, pp. 135-151, Springer Series in Reliability Engineering (2008)
- [Isermann, 1997](#) R. Isermann
Supervision, fault-detection and fault- diagnosis methods - An introduction
Control engineering practice, 5 (5) (1997), pp. 639–652
[Article](#) | [PDF \(1096 K\)](#) | [View Record in Scopus](#) | [Citing articles \(519\)](#)
- [Juuso, 2004](#) E.K. Juuso
Integration of intelligent systems in development of smart adaptive systems
International Journal of Approximate Reasoning, 35 (3) (2004), pp. 307–337
[Article](#) | [PDF \(521 K\)](#) | [View Record in Scopus](#) | [Citing articles \(56\)](#)
- [Juuso et al., 2005](#) Juuso, E.K. (2005). Nonlinear scaling of signals for intelligent analyzers. Intelligent signal processing, 2005 IEEE international workshop, pp. 316-321.
- [Juuso et al., 2014](#) Juuso, E.K. (2014). Intelligent indices for online monitoring of stress and condition. The 11th International Conference on Condition Monitoring and Machinery Failure Prevention Technologies, CM 2014 /MFPT 2014, 10-12 June 2014, Manchester.
- [Juuso et al., 2012](#) Juuso, E.K., Lahdelma S. (2012). Intelligent stress indices in fatigue detection.

Proceedings CM 2012 - MFPT 2012, pp. 654-664, June 2012. London, UK.

Juuso et al., 2013 Juuso, E.K, Ruusunen M. (2013). Fatigue prediction with intelligent stress indices based on torque measurements in a rolling mill. Proceedings of 10th International Conference on Condition Monitoring and Machinery Failure Prevention Technologies (CM 2013 and MFPT 2013) pp. 12, 18-20 June 2013, Krakow, Poland.

Keski-Säntti et al., 2006 Keski-Säntti, J. (2006). Operational reliability of remotely operated underground loaders - prognostic needs and possibilities. Prognostics for Industrial Machinery Availability, VTT Symposium, 243, pp 27-37.

Lahdelma et al., 2008 Lahdelma, S., Juuso, E. (2008). Signal processing in vibration analysis. Proceedings of the Fifth International Conference on Condition Monitoring and Machinery Failure Prevention Technologies, pp. 867-878. Edinburgh, UK.

Lahdelma and Juuso, 2011a S. Lahdelma, E. Juuso
Signal processing and feature extraction by using real order derivatives and generalised norms. Part 1: Methodology
The International Journal of Condition Monitoring, 1 (2) (2011), pp. 46-53
[View Record in Scopus](#) | [Citing articles \(21\)](#)

Lahdelma and Juuso, 2011b S. Lahdelma, E. Juuso
Signal processing and feature extraction by using real order derivatives and generalised norms. Part 2: Applications
The International Journal of Condition Monitoring, 1 (2) (2011), pp. 54-66
[View Record in Scopus](#) | [Citing articles \(18\)](#)

Laukka et al., 2015 Laukka, A., Saari, J., Ruuska, J., Juuso, E., Lahdelma, S. (2015). Condition-based monitoring for underground mobile machines. Int. J. Industrial and Systems Engineering. Unpublished.

Marquez and Gupta, 2006 A.C. Marquez, J.N.D. Gupta
Contemporary maintenance management: process, framework and supporting pillars
Omega - International Journal of Management Science, 34 (3) (2006), pp. 313-326

Mobley et al., 2002 Mobley, R.K. (2002). An introduction to predictive maintenance, Butterworth-Heinemann, The United States of America.

Nishijima, 1999 Kanazawa Nishijima
Stepwise S-N curve and fish-eye failure in gigacycle fatigue
Fatigue & fracture of engineering materials & structures, 22 (7) (1999), pp. 601-607
[Full Text via CrossRef](#)

Nissilä et al., 2014 Nissilä, J., Lahdelma, S., Laurila, J. (2014). Condition monitoring of the front axle of a load haul dumper with real order derivatives and generalised norms. The Eleventh International Conference on Condition Monitoring and Machinery Failure Prevention Technologies, CM2014/MFPT2014, pp. 407-426. June 2014, Manchester, UK.

Paavola et al., 2011 Paavola, M. (2011). An efficient entropy estimation approach, PhD thesis, University of Oulu.

Ruiz et al., 2014 P.P. Ruiz, B.K. Foquem, B. Grabot
Generating knowledge in maintenance from experience feedback
Knowledge-Based Systems., 68 (2014), pp. 4-20
[View Record in Scopus](#) | [Citing articles \(5\)](#)

Ruusunen et al., 2002 Ruusunen, M., Paavola, M. (2002). Quality monitoring and fault detection in an automated manufacturing system - a soft computing approach. University of Oulu, Control Engineering Laboratory, Report No 19.

Sayadi et al., 2012 R.S. Sayadi, A. Lashgari, J. Paraszczak
Hard-rock LHD cost estimation single and multiple regressions based on principal component analysis
Tunneling and Underground Space Technology, 27 (1) (2012), pp. 133-141

VDI, 2056 VDI 2056 (1964). Standards of evaluation for mechanical vibrations of machines.

Copyright © 2015 Published by Elsevier Ltd.

[About ScienceDirect](#)
[Terms and conditions](#)

[Contact and support](#)
[Privacy policy](#)

Copyright © 2015 Elsevier B.V. or its licensors or contributors. ScienceDirect® is a registered trademark of Elsevier B.V.

Cookies are used by this site. To decline or learn more, visit our [Cookies](#) page.

[Switch to Mobile Site](#)

This article belongs to a special issue

4th IFAC Workshop on Mining, Mineral and Metal
Processing MMM 2015 — Oulu, Finland, 25-27

[August 2015](#)

Edited By Kauko Leiviskä

Other articles from this special issue

[Validation of Three-phase CAS-OB CFD-Model](#)

Timo Kulju, Seppo Ollila, Riitta L. Keiski, Esa Muuri... [more](#)

[A Model of the CAS-OB Process for Online Applicat...](#)

Torstein Rotevatn, Stein O. Wasbø, Mika Järvinen, ... [more](#)

[Optimization of an Integrated Steel Plant with Carb...](#)

Hamid Ghanbari, Mikko Helle, Henrik Saxén [more](#)

[View more articles »](#)

Recommended articles

Citing articles (0)

Related book content
