

Document details

[< Back to results](#) | 1 of 1
[↗ Export](#)
[↓ Download](#)
[🖨 Print](#)
[✉ E-mail](#)
[Save to PDF](#)
[★ Add to List](#)
[More... >](#)

Proceedings of the International Conference on Industrial Engineering and Operations Management
 Volume 8-10 March 2016, 2016, Pages 1782-1787
 6th International Conference on Industrial Engineering and Operations Management in Kuala Lumpur, IEOM 2016;
 JW Marriott Hotel K L Kuala Lumpur; Malaysia; 8 March 2016 through 10 March 2016; Code 135628

Minimum quantity lubrication in micromachining: A greener approach

(Conference Paper)

Arham Bin Zulkifli, A.S., Bahar, R. ✉, Firdaus Ariff, T. 👤

Department of Manufacturing and Materials Engineering, Faculty of Engineering, International Islamic University
 Malaysia, Kuala Lumpur, Malaysia

Abstract

[View references \(9\)](#)

Minimum Quantity Lubrication (MQL) uses minimum amount of lubricating fluid to reduce the friction between a cutting tool and the work piece. The conventional cutting fluid applied using flooding method causes high volume of the coolant wastage plus environmental damages due to disposal issues. MQL is suitable for machining operations including milling, turning, and drilling while surface modification processes are not very appropriate for MQL due to occurrence of particle sticking. For Micromachining, MQL has more opportunity as the heat generated in the small machining area can be smoothly transferred by MQL compared to flood cooling. Not much information are available about MQL performance and metal's thermal conductivity. In this paper, study of Micro-milling using MQL is presented. Three different metals have been tested with same cutting parameters to observe the effect of MQL on metal's thermal conductivity. Three different work metals are selected which are Copper, Aluminum alloy 1100 and Cast Iron with cutting parameters including depth of cut, feed rate, and spindle speed. Finally, surface roughness is measured to see the combined effect of thermal conductivity and MQL on the machined surface. It has been found that lower thermal conductivity metal is more suitable to employ MQL as the coolant method. © IEOM Society International. © IEOM Society International.

Author keywords

[Green Machining](#)
[Micro-machining](#)
[Micro-milling](#)
[Minimum Quantity Lubrication \(MQL\)](#)
[Thermal Conductivity](#)
ISSN: 21698767**ISBN:** 978-098554974-9**Source Type:** Conference Proceeding**Original language:** English**Document Type:** Conference Paper**Sponsors:** EATON Powering Business world wide, IEEE, informs, Official Airline Partner Emirates, SIEMENS**Publisher:** IEOM Society

References (9)

[View in search results format >](#)
 All
 [Export](#)
[🖨 Print](#)
[✉ E-mail](#)
[Save to PDF](#)
[Create bibliography](#)
 1 Cheng, K., Huo, D.

Micro-cutting: Fundamentals and applications

(2013) *Micro-Cutting: Fundamentals and Applications*, pp. 1-348. Cited 56 times.<http://onlinelibrary.wiley.com/book/10.1002/9781118536605>

ISBN: 978-111853660-5; 978-047097287-8

doi: 10.1002/9781118536605

[View at Publisher](#)

Metrics

0 Citations in Scopus

0 Field-Weighted Citation Impact



PlumX Metrics

Usage, Captures, Mentions, Social Media and Citations beyond Scopus.

Cited by 0 documents

Inform me when this document is cited in Scopus:

[Set citation alert >](#)[Set citation feed >](#)

Related documents

An investigation of force, surface roughness and chip in surface grinding of SKD 11 tool steel using minimum quantity lubrication-MQL technique

Soepangkat, B.O.P. , Agustin, H.C.K. , Subiyanto, H. (2017) *AIP Conference Proceedings*

Minimum quality lubrication (MQL) Present and future trends
 Koh, K.-W. (2015) *Society of Tribologists and Lubrication Engineers Annual Meeting and Exhibition 2015*

Research on minimal quantity lubrication of cutting oil in turning (effect of quantity of oil supply)

Matsuoka, H. , Ono, H. , Ryu, T. (2012) *Nihon Kikai Gakkai Ronbunshu, C Hen/Transactions of the Japan Society of Mechanical Engineers, Part C*

- 2 Chae, J., Park, S.S., Freiheit, T.
Investigation of micro-cutting operations
(2006) *International Journal of Machine Tools and Manufacture*, 46 (3-4), pp. 313-332. Cited 408 times.
doi: 10.1016/j.ijmachtools.2005.05.015
[View at Publisher](#)

- 3 Machado, A.R., Wallbank, J.
The effect of extremely low lubricant volumes in machining
(1997) *Wear*, 210 (1-2), pp. 76-82. Cited 115 times.
[View at Publisher](#)

- 4 Klocke, F., Eisenblaetter, G.
Dry cutting
(1997) *CIRP Annals - Manufacturing Technology*, 46 (2), pp. 519-526. Cited 399 times.
doi: 10.1016/S0007-8506(07)60877-4
[View at Publisher](#)


- 5 Heisel, U., Stuttgart, M.L., Spath, D., Wassmer, R., Karlsruhe, U.W., Lutz, M., Spath, D., (...), Karlsruhe, U.W.
Application of minimum quantity cooling lubrication technology in cutting processes
(1994) *Prod. Eng*, 2 (1), pp. 49-54. Cited 56 times.

- 6 McClure, T.F., Adams, R., Gugger, M.D.
Comparison of Flood vs. Microlubrication on Machining Performance (Part I)
(2007) . Cited 18 times.

- 7 Rahman, M., Senthil Kumar, A., Salam, M.U
Experimental evaluation on the effect of minimal quantities of lubricant in milling
(2002) *International Journal of Machine Tools and Manufacture*, 42 (5), pp. 539-547. Cited 144 times.
doi: 10.1016/S0890-6955(01)00160-2
[View at Publisher](#)

- 8 Walker, T.
The Handbook A guide to machining with Minimum Quantity Lubrication
(2013) . Cited 4 times.
Unist, Inc

- 9 Groover, M.
Fundamentals of modern manufacturing
(2010) . Cited 716 times.
4th edition

 Bahar, R.; Department of Manufacturing and Materials Engineering, Faculty of Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia; email:rbahar@iiu.edu.my

© Copyright 2017 Elsevier B.V., All rights reserved.