

Phenomenon of twist drill

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In 1770 an Englishman, P. Cooke, had a twist drill patented, a tool, which has such specifications at its application, that are not typical for other tools, in spite of its defined geometric shape. During drilling it behaves like a helical spring, it turns as a result of cutting resistance after first turn and it tries to screw off and screw in, which leads to the occurrence of torsional vibration. Cutting speed changes considerably along the cutting edge of the drill, by which the coefficient of friction with drilled material and cutting wedge wear change as well. A built-up edge on the face area occurs on certain section of cutting edge and it tears off. By this cutting conditions change, working face angle, radius of „plastic“ tip of the built-up edge and the quality of surface of drilled hole. These specific phenomena are identified in the paper.

Keywords: cutting, drilling, quality of surface, tool wear

References

- [1] BUDA, J., BÉKÉŠ, J.: *Teoretické základy obrábania kovov*. Bratislava: ALFA, 1977, 698 s.
- [2] DMOCHOWSKI, J.: *Podstawy obróbki skrawaniem*. Warszawa: Państwowe Wydawnictwo Naukowe, 1978, 586 s.
- [3] GENSKÝ, R.: *Metal cutting operations*. Leipzig: Edition Leibzig, 1966, 191 s.
- [4] GRZESIK, W.: *Podstawy skrawania materiałów metalowych*. Warszawa: Wydawnictwa Naukowo - Techniczne, 2010, 526 s., ISBN 978-83-204-3668-6.
- [5] HRUBEC, J.: Niektoré poznatky o plastických deformáciách pri vrtaní. *Strojirenství* 18, 1968, č. 7.
- [6] HOLEŠOVSKÝ, F., NAPRSTKOVÁ, N., NOVÁK, M.: GICS for grinding process optimalization. In: *Manufacturing Technology*, 2012, Vol. 12, Nr. 12
- [7] MAJERIK, J., JAMRICHOVÁ, Z., BOBRIKOVÁ, M.: The verification of axial forces and torques in drilling by the noncoated cutting tools and drills with PVD coating. In: *Annals & Proceedings of the 23rd International DAAAM Symposium*, Vol. 23, No 1, ISSN 2304-1382
- [8] MAKEDONSKI, A., OHRIDSKI, K.: Unconventional machining method for enhancing the durability of tools and strength of the specimens bonded. In: *Manufacturing Technology*, December 2011, Vol. 11, No 11
- [9] NOVAK, M. (2012). Surfaces with high precision of roughness after grinding. In *Manufacturing Technology*, vol. 12., no. 12., UJEP, Usti nad Labem, 66-70 pp.
- [10] STEPHENSON, D. A., AGAPIOU, J. S.: *Metal Cutting Theory and Practice*. New York: Taylor & Francis 2006, pp 846, ISBN 0-8247-5888-9
- [11] VASILKO, K., MÁDL, J.: *Teorie obrábění 1. díl*. Ústí nad Labem: Univerzita J.E. Purkyně, 2012, 298 s., ISBN 978-80-7414-459-2,

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