



Obrabotka metallov - Metal Working and Material Science

Journal homepage: http://journals.nstu.ru/obrabotka_metallov



Technological Investigation of Effect of Machining Parameter on Tool Life

Manojkumar Sheladiya^{1, 2, a, *}, Shailee Acharya^{3, b}, Ghanshyam Acharya^{4, c}

¹ Gujarat Technological University, Ahmedabad, 382424, India

² Atmiya University, Faculty of Engineering & Technology, Yogidham Gurukul, Kalawad Road, Rajkot, 360005, India

³ Sardar Vallabhbhai Patel Institute of Technology, Affiliated to GTU, Vasad, 388306, India

⁴ Atmiya Institute of Technology and Science, Yogidham Gurukul, Kalawad Road, Rajkot, 360005, India

^a <https://orcid.org/0000-0002-9154-3355>, mvsheladiya@gmail.com, ^b <https://orcid.org/0000-0001-6428-8961>, shailee.acharya@gmail.com,

^c <https://orcid.org/0000-0002-3580-3116>, gdacharya@rediffmail.com

ARTICLE INFO

Article history:

Received: 11 September 2020

Revised: 06 October 2020

Accepted: 15 November 2020

Available online: 15 December 2020

Keywords:

Tool life

Metal removed

Surface Roughness

Tool bit temperature

Acknowledgment

The group of authors is very much obligated to the Atmiya University, Rajkot for availing the facility of CNC machine and other facilities and VVP College, Rajkot for providing the facility of an optical microscope.

ABSTRACT

Introduction. The machinability is typical criteria to be investigated and different authors suggested different parameters describing its quantification. Different parameters i. e. speed, feed, depth of cut, tool work-piece combination, machine types and its condition, cutting fluid, machinist expertise, etc. are contributing directly to the tool life. The selection of the tool for the machining impacts greatly on the economic viability of the machining in terms of energy usage and tooling costs. **The method of investigation.** The current research emphasis mainly on tool life investigation when machining the mild steel specimens ISRO 50, BIS 1732:1989 at constant cutting speed i.e. 200 m / min. In the industries the mild steel material is commonly used for various products manufacturing. Considering the high demands on productivity and surface finish, machining at 200 m / min is the preferred. The computerized numerical control machine (CNC DX-150) is used for the turning. The four corner insert (TNMG 120408) is used for different machining times i.e. 10, 15, 20 and 25 minutes respectively. The flank wear of the tool is measured with calibrated optical microscope. The temperature of the tool corner during machining is continuously measured for possible impact of temperature on bonding properties of the tool insert and impact on red hardness. **Results and discussion.** The plot of flank wear vs. machining time will give the value of tool life. The other quality output parameter, such as surface roughness, is measured after machining, indicating surface irregularities in root means square value. Efforts have been made to identify the relationship of tool life, machining time, the quantity of metal removed, surface roughness, and tool bit temperature.

For citation: Sheladiya M.V., Acharya S.G., Acharya G.D. Technological investigation of effect of machining parameter on tool life. *Obrabotka metallov (tehnologiya, oborudovanie, instrumenty) = Metal Working and Material Science*, 2020, vol. 22, no. 4, pp. 41–53. DOI: 10.17212/1994-6309-2020-22.4-41-53. (In Russian).

References

1. Sheikh-Ahmad J., Davim J.P. Tool wear in machining processes for composites. *Machining technology for composite materials: principles and practice*. Cambridge, UK, Philadelphia, PA, 2012, ch. 5, pp. 116–153. DOI: 10.1533/9780857095145.1.116.
2. Paul S., Chattopadhyay A.B. Environmentally conscious machining and grinding with cryogenic cooling. *Machining Science and Technology*, 2006, vol. 10, iss. 1, pp. 87–131. DOI: 10.1080/10910340500534316.
3. Zakovorotny V.L., Lapshin V.P., Babenko T.S. Modeling of tool wear: irreversible energy transformations. *Russian Engineering Research*, 2018, vol. 38, iss. 9, pp. 707–708. DOI: 10.3103/S1068798X18090290.

* Corresponding author

Sheladiya Manojkumar V., M.Tech. (Engineering), Assistant Professor
 Atmiya University, Faculty of Engineering & Technology,
 Yogidham Gurukul, Kalawad Road,
 360005, Rajkot, Gujarat, India.
 Tel.: +91-9898278267, e-mail: mvsheladiya@gmail.com