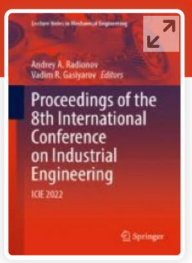

International Conference on Industrial Engineering
↳ ICIE 2022: **Proceedings of the 8th International Conference on Industrial Engineering** pp 915–924

Peakless Rotary Cutter Design for Finish Turning

T. L. Yevtushenko, A. Zh. Kassenov ✉, Zh. K. Mussina, A. S. Yanyushkin & K. K. Abishev

Conference paper | First Online: 16 August 2022

Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

The article discusses the design of peakless rotary cutters and their application. A turning tool with a radius cutting part is offered – for finishing turning of increased surface quality and diameter accuracy. The peakless tool is devoid of one of the design drawbacks. Makes it possible to increase the efficiency of finishing machining of the outer surfaces of bodies of revolution in comparison with processing with a traditional turning cutter due to the absence of the tip of the cutter, increasing the tool life, multiplying the total resource of the tool, improving the quality of the

processed surface, reducing the temperature and specific load on the cutting edges in the cutting zone. When using a new cutter, wear is reduced and the tool life increases, due to the rotation of the insert, the quality of the machined surface increases, including a decrease in roughness, which is especially important for finishing. The new tool lacks a cutter tip, increases the strength of the blade, reduces power and thermal stresses on the cutting edge, in the central part of the contact zone between the cutting edge of the cutter and the workpiece, good conditions are created for cleaning the machined surface with a straight cutting-edge line. Due to its advantages, cutting by peakless rotary turning tools is widely used in mechanical engineering. New types of peakless rotary turning tools continue to be developed, which in some parameters are significantly superior to conventional cutting tools.

Keywords

Mechanical engineering **Turning** **Cutter** **Peakless turning tool** **Rotary tool** **Precision** **Quality** **Resource** **Durability**

References

1. Comprehensive plan for the development of mechanical engineering in Kazakhstan for 2019–203. Astana0 (2018)

2. Dudak, N.S., Itybaeva, G.T., Taskarina, A., et al.: A new pass-through lathe cutter. J. Russ. Eng. Res. **34**, 705–707 (2014). https://doi.org/10.3103/S1068798X14110069

3. Kulikov, M., Popov, A., Volkov, D.V.: Implementation of rotary turning in production conditions. J. Bull. Bryansk State Tech. Univ. **6**(59), 28–31 (2017). https://doi.org/10.12737/article_59cd769d871dd9.90790664

4. Yandex. Patents. https://yandex.ru/patents

5. Karpov, A.B., Zelinsky, B.B.: Improvement of finishing turning by using tools of topless structures. Mech. Eng. Life Saf. **3**, 53–57 (2011)

6. Sitnikov, M.J.: The use of vertexless tools in the process of turning. In: All-Russian annual scientific-practical conference Society. The science. Innovations (NPK-2017). Vyatka State University, Kirov, 01–29 April 2017 (2017)

7. Grechishnikov, V.A., Romanov, V.B., Antonova, A.A., et al.: Assembly cutter. RU Patent 180034, 1 June 2018 (2018)

8. Alekseeva, A.A., Grechishnikov, V.A., Romanov, V.B.: Improving the efficiency of turning tools based on the creation of a structure with adjustable geometric parameters. In: XIII All-Russian Conference Mechanical Engineering: Traditions and Innovations (MTI-2020). Moscow State Technological University "STANKIN". Moscow, 26 October 2020 (2020)

9. Zverovshchikov, A.E., Artemov, I.I., Samokhin, N.V.: A scientific approach to ensuring the accuracy of turning tool holders with replaceable non-sharpened plates. N High-tech Technol. Mech. Eng. **4**, 11–16 (2017)

10. Brailovskii, M.I., Voskoboinik, A.G., D'yakonov, A.A., et al.: Erratum to: Optimal materials for the manufacture of metal-cutting machines. J. Russ. Eng. Res. **37**, 277 (2017). https://doi.org/10.3103/S1068798X17030248

11. Makarov, A.D.: Optimizatsiya protsessov rezaniya (Optimization of cutting processes). Mechanical Engineering. Moscow (1976)

12. Yashcheritsyn, P.I., Feldstein, E.E., Kornievich, M.A.: Teoriya rezaniya (Cutting theory). Minsk. Belarus (2006)

13. Kostenko, A.A., Kozlov, V.G., Zabolotnaya, A.A.: Cutting tool and its ways of improvement. In: 68 Student Scientific Conference. Voronezh State Agrarian University Emperor Peter I. Voronezh, 01 March 2017 (2017)

14. Averin, N.V., Mozhaev, A.A.: Cutters of turners-innovators. In: XVII International Scientific and Technical Conference New

technologies in the educational process and production. “Ryazanproekt” LLC. Ryazan, 17–19 April 2019 (2019)

15. Grechishnikov, V.A., Domnin, P.V., Kosarev, V.A., et al.: Modern methods for solving problems of forming complex cutting tools. N STIN **12**, 6–11 (2013)

16. Romanov, V.B., Shokhanova, N.O.: Turning tools with variable geometry, taking into account the shape and material of the workpiece. In: III All-Russian Scientific and Practical Conference Digital Economy: Technologies, Management, Human Capital. “Marker” LLC. Vologda, 25 September 2020 (2020)

17. Sorokin, N.V.: Study of the process of peakless turning. Mod. High-tech Technol. **8–1**, 103 (2013)

18. Sherov, K.T., Sikhimbayev, M.R., Donenbayev, B.S., et al.: Experimental research of rotational-and-frictional boring of big holes in large parts. J. Theoret. Appl. Mech. Sofia **47**(4), 23–36 (2017). https://doi.org/10.1515/jtam-2017-0018

19. Kasenov, A.Zh., Yevtushenko, T.L., Mussina,

Zh.K., et al.: Application for patent for invention No. 2021/0794.1 of the Republic of Kazakhstan dated 27.12.2021. Rotary peakless swivel lathe tool with chipbreaker (2021)

20. Trabelsi, H., Kannatey-Asibu, E.: Pattern-recognition analysis of sound radiation in metal cutting. J. Adv. Manuf. Technol. **6**, 220–231 (1991). https://doi.org/10.1007/BF02601795

21. Dudak, N., et al.: Hole machining based on using an incisive built-up reamer. Int. J. Precis. Eng. Manuf. **18**(10), 1425–1432 (2017). https://doi.org/10.1007/s12541-017-0170-9

22. Dudak, N.S., Itybaeva, G.T., Taskarina, A.Z., et al.: Processing of holes with a reamer-broach. J. Life Sci. J. **11**, 282–288 (2014). https://doi.org/10.7537/marslsj1110s14.50

23. Mukanov, R., Itybayeva, G., Strautmanis, G., et al.: Modeling of the cutting head for treating holes in the railway. N Procedia Comput. Sci. **149**, 355–359 (2019)

24. Khodzhibergenov, D.T., Esirkepov, A., Sherov, K.T.: Rational milling of metals. J. Russ. Eng. Res. **35**, 43–45 (2015). https://doi.org/10.3103/s1068798x1501013x

25. Mukanov, R.B., Kasenov, A.Z., Itybaeva, G.T., Musina, Z.K., Abishev, K.K., Bykov, P.O.: Face turning of holes. Russ. Eng. Res. **39**(1), 75–78 (2019). https://doi.org/10.3103/S1068798X19010064

26. Dudak, N., Itybaeva, G., Taskarina, A., et al.: Multi-flute drill-broach for precision machining of holes. J. Scientia Iranica **26**, 1415–1426 (2019). https://doi.org/10.24200/sci.2018.5623.1379

27. Kamoun, T., Guemri, K.: Modeling of the cutting effort. In: Kharrat, M., Baccar, M., Dammak, F. (eds.) ICAMEM 2019. LNME, pp. 32–37. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-52071-7_5

28. Ameur, T.: Optimal planning of multi-pass turning operations. In: Kharrat, M., Baccar, M., Dammak, F. (eds.) ICAMEM 2019. LNME, pp. 63–69. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-52071-7_9

29. Abishev, K.K., Kassenov, A.Z., Assylova, K.B.: Design justification of half-track propulsor of traction and transport vehicle. In: Radionov A.A., Gasiyarov V.R. (eds.) ICIE 2021. LNME. Springer, Cham (2022). https://doi.org/10.1007/978-3-030-85230-6_50

30. Khodzhibergenov, D.T., Ibragimova, Z.A., Khodzhibergenova, U.D., et al.: Software for tool design and testing. J. Russ. Eng. Res. **39**(9), 772–775 (2019). https://doi.org/10.3103/S1068798X19090090

31. Buss, D., Abishev, K.: Baltabekova A (2019) Driver`s reliability and its effect on road traffic safety. N Procedia Comput. Sci. ICTE **149**, 463–466 (2018)

Acknowledgments

The research was carried out within the framework of grant funding of young scientists for 2021–2023 under the project IRN AP09058231 “research and design of resource-energy-saving metal cutting tools”, funded by The Science Committee of the Ministry of education and science of the Republic of Kazakhstan. The authors are grateful to Assylova K.B., Sherov K.T. and A.Baltabekova [29–31] for preparing and collecting materials for this publication.

Author information

Authors and Affiliations

Toraighyrov University, 64, Lomov Str., Pavlodar, 140008, Kazakhstan

T. L. Yevtushenko, A. Zh. Kassenov, Zh. K. Mussina & K. K. Abishev

Chuvash State University I.N. Ulyanova, 15, Moskovsky Ave., Cheboksary, 428015, Russia

A. S. Yanyushkin

Corresponding author

Correspondence to A. Zh. Kassenov .

Editor information

Editors and Affiliations

Moscow Polytechnic University, Moscow, Russia

Prof. Andrey A. Radionov

Moscow Polytechnic University, Moscow, Russia

Prof. Vadim R. Gasiyarov

Rights and permissions

Copyright information

About this paper

Cite this paper

Yevtushenko, T.L., Kassenov, A.Z., Mussina, Z.K., Yanyushkin, A.S., Abishev, K.K. (2023). Peakless Rotary Cutter Design for Finish Turning. In: Radionov, A.A., Gasiyarov, V.R. (eds) Proceedings of the 8th International

Conference on Industrial Engineering. ICIE 2022. Lecture Notes in Mechanical Engineering. Springer, Cham.
https://doi.org/10.1007/978-3-031-14125-6_89

DOI
https://doi.org/10.1007/978-3-031-14125-6_89

Published	Publisher Name	Print ISBN
16 August 2022	Springer, Cham	978-3-031-14124-9

Online ISBN	eBook Packages
978-3-031-14125-6	Engineering Engineering (R0)