

decreases.

- Feed rate and depth of cut increases with all the output performances are increased.
- Surface roughness decreases with increasing nose radius, 1.2mm nose radius tool insert exhibits better performance.
- Lower cutting force and tool tip temperature achieved with 0.4mm nose radius.
- In all the cases 0.8 mm NR exhibits nominal performance.

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REFERENCES

- [1] Mourad D, Hedj OL, Rachid L, Ahmed M. (2017). Experimental characterization of the Heat Affected Zone (HAZ) properties of 100Cr6 steel joined by rotary friction welding method. *Mathematical Modelling of Engineering Problems* 4: 43-47. <https://doi.org/10.18280/mmep.040109>
- [2] Paul G, Patra P. (2017). A publication of IIETA Prediction of tangential force and maximum temperature generation at the tool tip using ANFIS model during CNC turning operations for an intricate shape. *Mathematical Modelling of Engineering Problems* 4: 106-112. <http://dx.doi.org/10.18280/mmep.040208>
- [3] Sivaiah P, Chakradhar D. (2017). Machinability studies on 17-4 PH stainless steel under cryogenic cooling environment. *Mater. Manuf. Process* 1-14. <https://doi.org/10.1080/10426914.2017.1339317>
- [4] Paul S, Dhar NR, Chattopadhyay AB. (2001). Chattopadhyay, beneficial effects of cryogenic cooling over dry and wet machining on tool wear and surface finish in turning AISI 1060 steel. *J. Mater. Process. Technol.* 116: 44-48. [https://doi.org/10.1016/S0924-0136\(01\)00839-1](https://doi.org/10.1016/S0924-0136(01)00839-1)
- [5] Noordin MY, Venkatesh VC, Sharif S, Elting S, Abdullah A. (2004). Application of response surface methodology in describing the performance of coated carbide tools when turning AISI 1045 steel. *J. Mater. Process. Technol.* 145: 46-58. [https://doi.org/10.1016/S0924-0136\(03\)00861-6](https://doi.org/10.1016/S0924-0136(03)00861-6)
- [6] Ciftci I. (2006). Machining of austenitic stainless steels using CVD multi-layer coated cemented carbide tools. *Tribol. Int.* 39: 565-569. <https://doi.org/10.1016/j.triboint.2005.05.005>
- [7] SreeramaReddy TV, Sornakumar T, VenkataramaReddy M, Venkatram R. (2009). Machinability of C45 steel with deep cryogenic treated tungsten carbide cutting tool inserts. *Int. J. Refract. Met. Hard Mater.* 27: 181-185. <https://doi.org/10.1016/j.ijrmhm.2008.04.007>
- [8] Sivaraman V, Sankaran S, Vijayaraghavan L. (2012). Machinability of multiphase microalloyed steel. *Procedia CIRP.* 2: 55-59. <https://doi.org/10.1016/j.procir.2012.05.039>
- [9] Chinchalikar S, Choudhury SK. (2013). Investigations on machinability aspects of hardened AISI 4340 steel at different levels of hardness using coated carbide tools. *Int. J. Refract. Met. Hard Mater.* 38: 124-133. <https://doi.org/10.1016/j.ijrmhm.2013.01.013>
- [10] Jackson MJ, Machado AR, Barrozo MAS, Santos MC, Ezugwu EO. (2015). Multi-objective optimization of cutting conditions when turning aluminum alloys (1350-O and 7075-T6 grades) using a genetic algorithm. *Mach. with Nanomater.* Second Ed. 323-346. https://doi.org/10.1007/978-3-319-19009-9_12
- [11] Kishore DSC, Rao KP, Mahamani A. (2014). Investigation of cutting force, surface roughness and flank wear in turning of In-situ Al6061-TiC metal matrix composite. *Procedia Mater. Sci.* 6: 1040-1050. <https://doi.org/10.1016/j.mspro.2014.07.175>
- [12] Moreno LH, Ciacedo JC, Martinez F, Bejarano G, Battaille TS, Prieto P. (2010). Wear evaluation of WC inserts coated with TiN/TiAlN multilayers. *J. Brazilian Soc. Mech. Sci. Eng.* 32: 114-118.
- [13] Vasu M, Nayaka HS. (2018). Investigation of machinability characteristics on EN47 steel for cutting force and tool wear using optimization technique. *Mater. Res. Express* 5(6): 066501. <http://dx.doi.org/10.1088/2053-1591/aac67f>
- [14] Vasu M, Nayaka HS. (2018). Investigation of cutting force tool tip temperature and surface roughness during dry machining of spring steel. *Mater. Today Proc.* 5: 7141-7149. <https://doi.org/10.1016/j.matpr.2017.11.379>
- [15] Vasu M, Shivananda NH. (2018). Comparative study of coated and uncoated tool inserts with dry machining of EN47 steel using Taguchi L₉ optimization technique. In: *AIP Conf. Proc.* 2018.
- [16] Sayeed Ahmed GM, Quadri SSH, Mohiuddin MS. (2015). Optimization of feed and radial force in turning process by using taguchi design approach. *Mater. Today Proc.* 2: 3277-3285. <https://doi.org/10.1016/j.matpr.2015.07.141>
- [17] Badiger PV, Desai V, Ramesh MR, Raveendra K. (2018). Optimization of machining parameters in turning process of Mdn431 using Ti-Multilayer Coated Tool, X.
- [18] Nayak M, Sehgal R. (2015). Effect of tool material properties and cutting conditions on machinability of AISI D6 steel during hard turning. *Arab. J. Sci. Eng.* 40: 1151-1164. <https://doi.org/10.1007/s13369-015-1578-0>
- [19] Ashrith HS, Doddamani M, Gaitonde V, Gupta N. (2018). Hole quality assessment in drilling of glass microballoon/epoxy syntactic foams. *Jom.* 70: 1-6. <https://doi.org/10.1007/s11837-018-2925-x>
- [20] Pawade RS, Joshi SS, Brahmkar PK, Rahman M. (2007). An investigation of cutting forces and surface damage in high-speed turning of Inconel 718. *J. Mater. Process. Technol.* 192-193, 139-146. <https://doi.org/10.1016/j.jmatprotec.2007.04.049>
- [21] Chabbi A, Yallese MA, Nouioua M, Meddour I, Mabrouki T, Girardin F. (2017). Modeling and optimization of turning process parameters during the cutting of polymer (POM C) based on RSM, ANN, and DF methods. *Int. J. Adv. Manuf. Technol.* 91: 2267-2290. <https://doi.org/10.1007/s00170-016-9858-8>
- [22] Bensouilah H, Aouici H, Meddour I, Yallese MA, Mabrouki T, Girardin F. (2016). Performance of coated and uncoated mixed ceramic tools in hard turning process. *Measurement* 82: 1-18. <https://doi.org/10.1016/j.measurement.2015.11.042>