

REFERENCES

- [1] A. D. Jayal, F. Badurdeen, O. W. D. Jr, and I. S. Jawahir, “Sustainable manufacturing : Modeling and optimization challenges at the product, process and system levels,” *CIRP J. Manuf. Sci. Technol.*, vol. 2, no. 3, pp. 144–152, 2010, doi: 10.1016/j.cirpj.2010.03.006.
- [2] U.S. Energy Information Administration, “International Energy Outlook 2019,” Washington, 2019.
- [3] Ceylon Electricity Board, “Annual Report 2016,” Sri Lanka, 2016. [Online]. Available: <https://www.ceb.lk/publication-media/annual-reports/79/en>.
- [4] S. G. Dambhare, S. J. Deshmukh, and A. B. Borade, “Machining parameter optimization in turning process for sustainable manufacturing,” *Int. J. Ind. Eng. Comput.*, vol. 6, no. 3, pp. 327–338, 2015, doi: 10.5267/j.ijiec.2015.3.002.
- [5] A. Campitelli, J. Cristobal, J. Fischer, B. Becker, and L. Schebek, “Resource efficiency analysis of lubricating strategies for machining processes using life cycle assessment methodology,” *J. Clean. Prod.*, vol. 222, pp. 464–475, 2019, doi: 10.1016/j.jclepro.2019.03.073.
- [6] C. Camposeco-Negrete, J. D. C. D. Nájera, and J. C. Miranda-Valenzuela, “Optimization of cutting parameters to minimize energy consumption during turning of AISI 1018 steel at constant material removal rate using robust design,” *Int. J. Adv. Manuf. Technol.*, vol. 83, no. 5–8, pp. 1341–1347, 2015, doi: 10.1007/s00170-015-7679-9.
- [7] L. Y. Y. Lu, C. H. Wu, and T. Kuo, “Environmental principles applicable to green supplier evaluation by using multi-objective decision analysis,” *Int. J. Prod. Res.*, vol. 45, no. 18–19, pp. 4317–4331, 2007, doi: 10.1080/00207540701472694.
- [8] J. A. Ghani, M. Rizal, and C. H. C. Haron, “Performance of green machining : a comparative study of turning ductile cast iron FCD700,” *J. Clean. Prod.*, vol. 85, pp. 289–292, 2014, doi: 10.1016/j.jclepro.2014.02.029.
- [9] F. Pusavec, P. Krajinik, and J. Kopac, “Transitioning to sustainable production – Part I : application on machining technologies,” *J. Clean. Prod.*, vol. 18, no. 2, pp. 174–184, 2010, doi: 10.1016/j.jclepro.2009.08.010.
- [10] J. Kopac, “Achievements of sustainable manufacturing by machining,” *J. Achiev. Mater. Manuf. Eng.*, vol. 34, no. 2, pp. 180–187, 2009.
- [11] I. Hanafi, A. Khamliche, F. M. Cabrera, E. Almansa, and A. Jabbouri, “Optimization of cutting conditions for sustainable machining of PEEK-CF30 using TiN tools,” *J. Clean. Prod.*, vol. 33, pp. 1–9, 2012, doi: 10.1016/j.jclepro.2012.05.005.
- [12] A. A. Munoz and P. Sheng, “An analytical approach for determining the environmental impact of machining processes,” *J. Mater. Process. Technol.*,

- vol. 53, no. 3–4, pp. 736–758, 1995, doi: 10.1016/0924-0136(94)01764-R.
- [13] J. B. Dahmus and T. G. Gutowski, “An Environmental Analysis of Machining,” in *Proceedings of IMECE2004*, 2004, pp. 1–10, doi: 10.1115/IMECE2004-62600.
 - [14] M. Nalbant, H. Gokkaya, and G. Sur, “Application of Taguchi method in the optimization of cutting parameters for surface roughness in turning,” *Mater. Des.*, vol. 28, no. 4, pp. 1379–1385, 2007, doi: 10.1016/j.matdes.2006.01.008.
 - [15] S. Thamizhmanii, S. Saparudin, and S. Hasan, “Analyses of surface roughness by turning process using Taguchi method,” *J. Achiev. Mater. Manuf. Eng.*, vol. 20, no. 1–2, pp. 503–506, 2007.
 - [16] A. K. Kulatunga, P. R. Jayatilaka, and M. Jayawickrama, “Drivers and barriers to implement sustainable manufacturing concepts in Sri Lankan manufacturing sector,” in *11th Global Conference on Sustainable Manufacturing*, 2013, pp. 171–176.
 - [17] G. Campatelli, “Analysis of the environmental impact for a turning operation of AISI 1040 steel,” in *IPROMS Conference*, 2014.
 - [18] T. Altan, B. Lilly, and Y. C. Yen, “Manufacturing of Dies and Molds,” *CIRP Ann.*, vol. 50, no. 2, pp. 404–422, 2001, doi: 10.1016/S0007-8506(07)62988-6.
 - [19] M. C. Cakir, O. Irfan, and K. Cavdar, “An expert system approach for die and mold making operations,” *Robot. Comput. Integrat. Manuf.*, vol. 21, pp. 175–183, 2005, doi: 10.1016/j.rcim.2004.07.015.
 - [20] M. Kurukulasuriya, J. Gamage, and J. Mangala, “Sustainable machining: Assessment of environmental performance of milling,” *Procedia Manuf.*, vol. 43, pp. 455–462, 2020, doi: 10.1016/j.promfg.2020.02.188.
 - [21] S. Ghosh and P. V. Rao, “Application of sustainable techniques in metal cutting for enhanced machinability : a review,” *J. Clean. Prod.*, vol. 100, pp. 17–34, 2015, doi: 10.1016/j.jclepro.2015.03.039.
 - [22] F. Pusavec *et al.*, “Sustainable machining of high temperature Nickel alloy Inconel 718 : part 1- predictive performance models,” *J. Clean. Prod.*, vol. 81, pp. 255–269, 2014, doi: 10.1016/j.jclepro.2014.06.040.
 - [23] W. Kloepffer, “Life Cycle Sustainability Assessment of Products,” *Int. J. Life Cycle Assess.*, vol. 13, no. 2, pp. 89–95, 2008, doi: 10.1065/lca2008.02.376.
 - [24] C. Camposeco-Negrete, “Optimization of cutting parameters for minimizing energy consumption in turning of AISI 6061 T6 using Taguchi methodology and ANOVA,” *J. Clean. Prod.*, vol. 53, pp. 195–203, 2013, doi: 10.1016/j.jclepro.2013.03.049.
 - [25] Y. Anand *et al.*, “Optimization of machining parameters for green manufacturing,” *Cogent Eng.*, vol. 3, no. 1, pp. 1–16, 2016, doi: 10.1080/23311916.2016.1153292.
 - [26] P. Zhou, B. W. Ang, and K. L. Poh, “A survey of data envelopment analysis in

- energy and environmental studies,” *Eur. J. Oper. Res.*, vol. 189, no. 1, pp. 1–18, 2008, doi: 10.1016/j.ejor.2007.04.042.
- [27] International Energy Agency, “World Energy Outlook 2019,” 2019. <https://www.iea.org/reports/world-energy-outlook-2019> (accessed Mar. 24, 2020).
 - [28] S. Hellweg and L. M. I. Canals, “Emerging approaches, challenges and opportunities in life cycle assessment,” *Science* (80-.), vol. 344, no. 6188, pp. 1109–1113, 2014, doi: 10.1126/science.1248361.
 - [29] M. F. Rajemi, P. T. Mativenga, and A. Aramcharoen, “Sustainable machining : selection of optimum turning conditions based on minimum energy considerations,” *J. Clean. Prod.*, vol. 18, no. 10–11, pp. 1059–1065, 2010, doi: 10.1016/j.jclepro.2010.01.025.
 - [30] G. Finnveden *et al.*, “Recent developments in Life Cycle Assessment,” *J. Environ. Manage.*, vol. 91, no. 1, pp. 1–21, 2009, doi: 10.1016/j.jenvman.2009.06.018.
 - [31] P. T. Mativenga and M. F. Rajemi, “Calculation of optimum cutting parameters based on minimum energy footprint,” *CIRP Ann. - Manuf. Technol.*, vol. 60, no. 1, pp. 149–152, 2011, doi: 10.1016/j.cirp.2011.03.088.
 - [32] F. Pusavec, D. Kramar, P. Krajinik, and J. Kopac, “Transitioning to sustainable production – part II : evaluation of sustainable machining technologies,” *J. Clean. Prod.*, vol. 18, no. 12, pp. 1211–1221, 2010, doi: 10.1016/j.jclepro.2010.01.015.
 - [33] J. R. Gamage, A. K. M. Desilva, D. Chantzis, and M. Antar, “Sustainable machining : Process energy optimisation of wire electrodischarge machining of Inconel and Titanium superalloys,” *J. Clean. Prod.*, vol. 164, pp. 642–651, 2017, doi: 10.1016/j.jclepro.2017.06.186.
 - [34] M. F. Rajemi, P. T. Mativenga, and S. I. Jaffery, “Energy and carbon footprint analysis for machining Titanium Ti-6Al-4V Alloy,” *J. Mach. Eng.*, vol. 9, no. 1, pp. 103–112, 2009.
 - [35] G. Y. Zhao *et al.*, “Energy Consumption in Machining: Classification, Prediction, and Reduction Strategy,” *Energy*, vol. 133, pp. 142–157, 2017, doi: 10.1016/j.energy.2017.05.110.
 - [36] W. Li and S. Kara, “An empirical model for predicting energy consumption of manufacturing processes: a case of turning process,” *Proc. Inst. Mech. Eng. Part B, J. Eng. Manuf.*, vol. 225, no. 9, pp. 1636–1646, 2011, doi: 10.1177/2041297511398541.
 - [37] F. Schultheiss, J. Zhou, E. Gröntoft, and J.-E. Ståhl, “Sustainable machining through increasing the cutting tool utilization,” *J. Clean. Prod.*, vol. 59, pp. 298–307, 2013, doi: 10.1016/j.jclepro.2013.06.058.
 - [38] S. Pervaiz, S. Kannan, and H. Kishawy, “An extensive review of the water consumption and cutting fluid based sustainability concerns in the metal cutting

- sector,” *J. Clean. Prod.*, vol. 197, no. 1, pp. 134–153, 2018, doi: 10.1016/j.jclepro.2018.06.190.
- [39] Y. Zhang, P. Zou, B. Li, and S. Liang, “Study on optimized principles of process parameters for environmentally friendly machining austenitic stainless steel with high efficiency and little energy consumption,” *Int. J. Adv. Manuf. Technol.*, vol. 79, pp. 89–99, 2015, doi: 10.1007/s00170-014-6763-x.
 - [40] A. Shokrani, V. Dhokia, and S. T. Newman, “Environmentally conscious machining of difficult-to-machine materials with regard to cutting fluids,” *Int. J. Mach. Tools Manuf.*, vol. 57, pp. 83–101, 2012, doi: 10.1016/j.ijmachtools.2012.02.002.
 - [41] I. Deiab, S. Waqar, and S. Pervaiz, “Analysis of Lubrication Strategies for Sustainable Machining during Turning of Titanium Ti - 6Al - 4V alloy,” in *Variety Management in Manufacturing. Proceedings of the 47th CIRP Conference on Manufacturing Systems*, 2014, vol. 17, pp. 766–771, doi: 10.1016/j.procir.2014.01.112.
 - [42] S. Debnath, M. M. Reddy, and Q. S. Yi, “Environmental friendly cutting fluids and cooling techniques in machining: A Review,” *J. Clean. Prod.*, vol. 83, pp. 33–47, 2014, doi: 10.1016/j.jclepro.2014.07.071.
 - [43] T. Gutowski *et al.*, “Environmentally benign manufacturing : Observations from Japan, Europe and the United States,” *J. Clean. Prod.*, vol. 13, no. 1, pp. 1–17, 2005, doi: 10.1016/j.jclepro.2003.10.004.
 - [44] W. L. R. Fernando, N. Sarmilan, K. C. Wickramasinghe, H. M. C. M. Herath, and G. I. P. Perera, “Experimental investigation of Minimum Quantity Lubrication (MQL) of coconut oil based Metal Working Fluid,” *Mater. Today Proc.*, vol. 23, no. 1, pp. 23–26, 2020, doi: 10.1016/j.matpr.2019.06.079.
 - [45] S. Masoudi, A. Vafadar, M. Hadad, and F. Jafarian, “Experimental investigation into the effects of nozzle position, workpiece hardness, and tool type in MQL turning of AISI 1045 steel,” *Mater. Manuf. Process.*, vol. 33, no. 9, pp. 1011–1019, 2017, doi: 10.1080/10426914.2017.1401716.
 - [46] S. Albert, I. Ahmed, and Y. Nukman, “A critical assessment of lubrication techniques in machining processes : a case for minimum quantity lubrication using vegetable oil-based lubricant,” *J. Clean. Prod.*, vol. 41, pp. 210–221, 2013, doi: 10.1016/j.jclepro.2012.10.016.
 - [47] E. A. Rahim and H. Sasahara, “A study of the effect of palm oil as MQL lubricant on high speed drilling of titanium alloys,” *Tribol. Int.*, vol. 44, no. 3, pp. 309–317, 2011, doi: 10.1016/j.triboint.2010.10.032.
 - [48] S. M. Ali, N. R. Dhar, and S. K. Dey, “Effect of minimum quantity lubrication (MQL) on cutting performance in turning medium carbon steel by uncoated carbide insert at different speed-feed combinations,” *Adv. Prod. Eng. Manag.*, vol. 6, no. 3, pp. 185–196, 2011.
 - [49] Y. Iskandar, A. Tendolkar, M. H. Attia, P. Hendrick, A. Damir, and C.

- Diakodimitris, "Flow visualization and characterization for optimized MQL machining of composites," *CIRP Ann. - Manuf. Technol.*, vol. 63, no. 1, pp. 77–80, 2014, doi: 10.1016/j.cirp.2014.03.078.
- [50] W. F. Castle, "Fifty-Years' Development of Cryogenic Liquefaction Process," in *Cryogenic Engineering: Fifty years of progress*, 2007, pp. 146–160.
 - [51] S. Y. Hong and M. Broomer, "Economical and ecological cryogenic machining of AISI 304 austenitic stainless steel," *Clean Prod. Process.*, vol. 2, pp. 157–166, 2000, doi: 10.1007/s100980000073.
 - [52] A. Aggarwal, H. Singh, P. Kumar, and M. Singh, "Optimizing power consumption for CNC turned parts using response surface methodology and Taguchi's technique — A comparative analysis," *J. Mater. Process. Technol.*, vol. 200, no. 1–3, pp. 373–384, 2007, doi: 10.1016/j.jmatprotec.2007.09.041.
 - [53] K. M. C. Öjmertz and H. B. Oskarson, "Wear on SiC-Whiskers Reinforced Ceramic Inserts When Cutting Inconel With Waterjet Assistance," *Tribol. Trans.*, vol. 42, no. 3, pp. 471–478, 1999, doi: 10.1080/10402009908982243.
 - [54] E. O. Ezugwu, J. Bonney, D. A. Fadare, and W. F. Sales, "Machining of nickel-base, Inconel 718, alloy with ceramic tools under finishing conditions with various coolant supply pressures," *J. Mater. Process. Technol.*, vol. 162–163, pp. 609–614, 2005, doi: 10.1016/j.jmatprotec.2005.02.144.
 - [55] A. R. Zareena, M. Rahman, and Y. S. Wong, "Binderless CBN Tools, a Breakthrough for Machining Titanium Alloys," *J. Manuf. Sci. Eng.*, vol. 127, no. 2, pp. 277–279, 2005, doi: 10.1115/1.1852570.
 - [56] M. Mia and N. R. Dhar, "Effect of high pressure coolant jet on cutting temperature, tool wear and surface finish in turning hardened (HRC 48) steel," *J. Mech. Eng.*, vol. 45, no. 1, pp. 1–6, 2015, doi: 10.3329/jme.v45i1.24376.
 - [57] S. Shaji and V. Radhakrishnan, "Analysis of process parameters in surface grinding with graphite as lubricant based on the Taguchi method," *J. Mater. Process. Technol.*, vol. 141, no. 1, pp. 51–59, 2003, doi: 10.1016/S0924-0136(02)01112-3.
 - [58] D. N. Rao and P. V. Krishna, "The influence of solid lubricant particle size on machining parameters in turning," *Int. J. Mach. Tools Manuf.*, vol. 48, no. 1, pp. 107–111, 2008, doi: 10.1016/j.ijmachtools.2007.07.007.
 - [59] A. Devillez, G. Le Coz, S. Dominiak, and D. Dudzinski, "Dry machining of Inconel 718, workpiece surface integrity," *J. Mater. Process. Technol.*, vol. 211, no. 10, pp. 1590–1598, 2011, doi: 10.1016/j.jmatprotec.2011.04.011.
 - [60] A. E. Diniz and R. Micaroni, "Cutting conditions for finish turning process aiming : the use of dry cutting," *Int. J. Mach. Tools Manuf.*, vol. 42, no. 8, pp. 899–904, 2002, doi: 10.1016/S0890-6955(02)00028-7.
 - [61] G. M. Krolczyk, P. Nieslony, R. W. Maruda, and S. Wojciechowski, "Dry cutting effect in turning of a duplex stainless steel as a key factor in clean production," *J. Clean. Prod.*, vol. 142, no. 4, pp. 3343–3354, 2017, doi:

10.1016/j.jclepro.2016.10.136.

- [62] M. Helu, B. Behmann, H. Meier, D. Dornfeld, G. Lanza, and V. Schulze, “Impact of green machining strategies on achieved surface quality,” *CIRP Ann. - Manuf. Technol.*, vol. 61, no. 1, pp. 55–58, 2012, doi: 10.1016/j.cirp.2012.03.092.
- [63] M. Helu, B. Behmann, H. Meier, D. Dornfeld, G. Lanza, and V. Schulze, “Total Cost Analysis of Process Time Reduction as a Green Machining Strategy,” in *Leveraging Technology for a Sustainable World, Proceedings of the 19th CIRP Conference on Life Cycle Engineering*, 2012, pp. 299–304, doi: 10.1007/978-3-642-29069-5_51.
- [64] V. N. Gaitonde, S. R. Karnik, L. Figueira, and J. P. Davim, “Machinability investigations in hard turning of AISI D2 cold work tool steel with conventional and wiper ceramic inserts,” *Int. J. Refract. Met. Hard Mater.*, vol. 27, no. 4, pp. 754–763, 2009, doi: 10.1016/j.ijrmhm.2008.12.007.
- [65] M. Dhananchezian and M. P. Kumar, “Cryogenic turning of the Ti – 6Al – 4V alloy with modified cutting tool inserts,” *Cryogenics (Guildf.)*, vol. 51, no. 1, pp. 34–40, 2011, doi: 10.1016/j.cryogenics.2010.10.011.
- [66] D. Jianxin, S. Wenlong, and Z. Hui, “Design , fabrication and properties of a self-lubricated tool in dry cutting,” *Int. J. Mach. Tools Manuf.*, vol. 49, pp. 66–72, 2009, doi: 10.1016/j.ijmachtools.2008.08.001.
- [67] E. J. A. Armarego, V. Karri, and A. J. R. Smith, “Fundamental studies of driven and self propelled rotary tool cutting processes - I. Theoretical Investigation,” *Int. J. Mach. Tools Manuf.*, vol. 34, no. 6, pp. 785–801, 1994, doi: 10.1016/0890-6955(94)90059-0.
- [68] E. J. A. Armarego, V. Karri, and A. J. R. Smith, “Fundamental studies of driven and self propelled rotary tool cutting processes - II. Experimental investigation,” *Int. J. Mach. Tools Manuf.*, vol. 34, no. 6, pp. 803–815, 1994, doi: 10.1016/0890-6955(94)90060-4.
- [69] S. Lei and W. Liu, “High-speed machining of titanium alloys using the driven rotary tool,” *Int. J. Mach. Tools Manuf.*, vol. 42, no. 6, pp. 653–661, 2002, doi: 10.1016/S0890-6955(02)00012-3.
- [70] W. H. Yang and Y. S. Tarn, “Design optimization of cutting parameters for turning operations based on the Taguchi method,” *J. Mater. Process. Technol.*, vol. 84, no. 1–3, pp. 122–129, 1998, doi: 10.1016/S0924-0136(98)00079-X.
- [71] R. K. Bhushan, “Optimization of cutting parameters for minimizing power consumption and maximizing tool life during machining of Al alloy SiC particle composites,” *J. Clean. Prod.*, vol. 39, pp. 242–254, 2013, doi: 10.1016/j.jclepro.2012.08.008.
- [72] A. Bhattacharya, S. Das, P. Majumder, and A. Batish, “Estimating the effect of cutting parameters on surface finish and power consumption during high speed machining of AISI 1045 steel using Taguchi design and ANOVA,” *Prod. Eng.*,

- vol. 3, no. 1, pp. 31–40, 2009, doi: 10.1007/s11740-008-0132-2.
- [73] G. Kant and K. S. Sangwan, “Prediction and optimization of machining parameters for minimizing power consumption and surface roughness in machining,” *J. Clean. Prod.*, vol. 83, pp. 151–164, 2014, doi: 10.1016/j.jclepro.2014.07.073.
 - [74] O. Zerti, M. A. Yallese, R. Khettabi, K. Chaoui, and T. Mabrouki, “Design optimization for minimum technological parameters when dry turning of AISI D3 steel using Taguchi method,” *Int. J. Adv. Manuf. Technol.*, vol. 89, no. 5–8, pp. 1915–1934, 2016, doi: 10.1007/s00170-016-9162-7.
 - [75] A. Zerti, M. A. Yallese, I. Meddour, S. Belhadi, A. Haddad, and T. Mabrouki, “Modeling and multi-objective optimization for minimizing surface roughness, cutting force, and power, and maximizing productivity for tempered stainless steel AISI 420 in turning operations,” *Int. J. Adv. Manuf. Technol.*, vol. 102, pp. 135–157, 2019, doi: 10.1007/s00170-018-2984-8.
 - [76] A. Kulkarni, H. Mandave, and V. Sabnis, “Optimization of Power Consumption for CNC Turning Of AISI 1040 Steel Using Taguchi Approach,” *Int. J. Innov. Res. Sci. Eng. Technol.*, vol. 3, no. 8, pp. 15383–15390, 2014, doi: 10.15680/IJIRSET.2014.0308043.
 - [77] P. W. Marksberry, “Micro-flood (MF) technology for sustainable manufacturing operations that are coolant less and occupationally friendly,” *J. Clean. Prod.*, vol. 15, no. 10, pp. 958–971, 2007, doi: 10.1016/j.jclepro.2006.01.006.
 - [78] O. Pereira, A. Rodriguez, A. I. Fernández-abia, J. Barreiro, and L. N. Lopez de Lacalle, “Cryogenic and minimum quantity lubrication for an eco-efficiency turning of AISI 304,” *J. Clean. Prod.*, vol. 139, pp. 440–449, 2016, doi: 10.1016/j.jclepro.2016.08.030.
 - [79] M. Siniawski and C. Bowman, “Metal working fluids : finding green in the manufacturing process,” *Ind. Lubr. Tribol.*, vol. 61, no. 2, pp. 60–66, 2009, doi: 10.1108/00368790910940374.
 - [80] A. R. Machado and J. Wallbank, “The effect of extremely low lubricant volumes in machining,” *Wear*, vol. 210, no. 1–2, pp. 76–82, 1997, doi: 10.1016/S0043-1648(97)00059-8.
 - [81] A. Bjorn, M. Owsiania, C. Molin, and M. Z. Hauschild, “LCA History,” in *Life Cycle Assessment Theory and Practice*, 2017, pp. 17–30.
 - [82] R. G. Hunt, J. D. Sellers, and W. E. Franklin, “Resource and environmental profile analysis: A life cycle environmental assessment for products and procedures,” *Environ. Impact Assess. Rev.*, vol. 12, no. 3, pp. 245–269, 1992, doi: 10.1016/0195-9255(92)90020-x.
 - [83] J. B. Guinee *et al.*, “Life Cycle Assessment : Past, Present, and Future,” *Environ. Sci. Technol.*, vol. 45, no. 1, pp. 90–96, 2011, doi: 10.1021/es101316v.
 - [84] P. C. F. Bekker, “A Life-cycle Approach in Building,” *Build. Environ.*, vol. 17,

- no. I, pp. 55–61, 1982, doi: 10.1016/0360-1323(82)90009-9.
- [85] F. Brentrup, J. Küsters, H. Kuhlmann, and J. Lammel, “Environmental impact assessment of agricultural production systems using the life cycle assessment methodology I . Theoretical concept of a LCA method tailored to crop production,” *Eur. J. Agron.*, vol. 20, no. 3, pp. 247–264, 2004, doi: 10.1016/S1161-0301(03)00024-8.
- [86] E. A. Nanaki and C. J. Koroneos, “Comparative LCA of the use of biodiesel, diesel and gasoline for transportation,” *J. Clean. Prod.*, vol. 20, no. 1, pp. 14–19, 2012, doi: 10.1016/j.jclepro.2011.07.026.
- [87] K. Andersson, “LCA of Food Products and Production Systems,” *Int. J. Life Cycle Assess.*, vol. 5, no. 4, pp. 239–248, 2000, doi: 10.1007/BF02979367.
- [88] S. D. Kleban, G. F. Luger, and R. D. Watkins, “Expert system support for environmental assessment of manufacturing products and facilities,” *J. Intell. Manuf.*, vol. 7, no. 1, pp. 39–53, 1996, doi: 10.1007/BF00114137.
- [89] E. A. Huang and D. J. Hunkeler, “Using life-cycle assessments in large corporations: A survey of current practices,” *Environ. Qual. Manag.*, vol. 5, no. 2, pp. 35–47, 1995, doi: 10.1002/tqem.3310050205.
- [90] J. S. Cooper and J. A. Fava, “Life-Cycle Assessment Practitioner Survey,” *J. Ind. Ecol.*, vol. 10, no. 4, pp. 12–14, 2006, doi: 10.1162/jiec.2006.10.4.12.
- [91] International organization for Standardization, “Environmental management - Life cycle assessment - Principles and framework,” *ISO Stand. No. 14040 1997(E)*, 1997.
- [92] International organization for Standardization, “ISO 14044:2006 Environmental management — Life cycle assessment — Requirements and guidelines.” <https://www.iso.org/standard/38498.html> (accessed Apr. 23, 2020).
- [93] D. G. Woodward, “Life cycle costing--theory, information acquisition and application,” *Int. J. Proj. Manag.*, vol. 15, no. 6, pp. 335–344, 1997, doi: 10.1016/s0263-7863(96)00089-0.
- [94] D. Hunkeler and G. Rebitzer, “The Future of Life Cycle Assessment,” *Int. J. Life Cycle Assess.*, vol. 10, no. 5, pp. 305–308, 2005, doi: 10.1065/lca2005.09.001.
- [95] R. Grießhammer, M. Buchert, C.-O. Gensch, C. Hochfeld, A. Manhart, and I. Rudenauer, “PROSA – Product Sustainability Assessment,” Freiburg, 2007.
- [96] W. Klopffer and B. Grahl, *Life Cycle Assessment (LCA) A Guide to Best Practice*. Weinheim: Wiley-VCH, 2014.
- [97] I. V. Muralikrishna and V. Manickam, “Life Cycle Assessment,” in *Environmental Management*, 2017, pp. 57–75.
- [98] C. Jiménez-González, S. Kim, and M. R. Overcash, “Methodology for Developing Gate-to-Gate Life Cycle Inventory Information,” *Int. J. Life Cycle*

- Assess.*, vol. 5, no. 3, pp. 153–159, 2000, doi: 10.1007/bf02978615.
- [99] D. A. L. Silva, R. A. P. Filleti, A. L. Christoforo, E. J. Silva, and A. R. Ometto, “Application of Life Cycle Assessment (LCA) and Design of Experiments (DOE) to the monitoring and control of a grinding process,” in *The 22nd CIRP conference on Life Cycle Engineering Application*, 2015, vol. 29, pp. 508–513, doi: 10.1016/j.procir.2015.01.037.
 - [100] A. F. Clarens, J. B. Zimmerman, G. A. Keoleian, K. I. M. F. Hayes, and S. J. Skerlos, “Comparison of Life Cycle Emissions and Energy Consumption for Environmentally Adapted Metalworking Fluid Systems,” *Environ. Sci. Technol.*, vol. 42, no. 22, pp. 8534–8540, 2008, doi: 10.1021/es800791z.
 - [101] M. Mia *et al.*, “Multi-objective optimization and life cycle assessment of eco-friendly cryogenic N2 assisted turning of Ti-6Al-4V,” *J. Clean. Prod.*, vol. 210, pp. 121–133, 2019, doi: 10.1016/j.jclepro.2018.10.334.
 - [102] H. Narita, N. Desmira, H. Fujimoto, and T. Che, “Environmental Burden Analysis for Machining Operation Using LCA Method,” in *The 41st CIRP Conference on Manufacturing Systems*, 2008, pp. 65–68.
 - [103] M. A. Curran, “Strengths and Limitations of Life Cycle Assessment,” in *Background and Future Prospects in Life Cycle Assessment*, Ohio, 2014, pp. 189–206.
 - [104] S. M. Lloyd and R. Ries, “Characterizing, Propagating, and Analyzing Uncertainty in Life-Cycle Assessment: A Survey of Quantitative Approaches,” *J. Ind. Ecol.*, vol. 11, no. 1, pp. 161–179, 2007, doi: 10.1162/jiec.2007.1136.
 - [105] S. W. M. A. I. Senevirathne, “Effect of Air and Chilled Emulsion Minimum Quantity Lubrication (ACEMQL) in Machining Hard to Cut Metals,” 2015.
 - [106] U. P. Kahangamage and K. H. J. Mangala, “Investigation of Problematic Issues of Mould Design and Manufacture for Plastic-based Industry in Sri Lanka,” *Annu. Trans. IESL*, 2005.
 - [107] Y. Levy and T. J. Ellis, “A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research,” *Informing Sci. J.*, vol. 9, pp. 181–211, 2006.
 - [108] S. W. M. A. . Senevirathne and H. K. G. Punchihewa, “Effect of minimum quantity lubrication aerosol temperature on tool life in machining AISI P20 and D2 steels using coated tungsten carbide tool inserts,” 2016. doi: 10.1109/MERCon.2016.7480137.
 - [109] S. W. M. A. I. Senevirathne and H. K. G. Punchihewa, “Comparison of tool life and surface roughness with MQL , flood cooling , and dry cutting conditions with P20 and D2 steel Comparison of tool life and surface roughness with MQL , flood cooling , an d dry cutting conditions with P20 and D2 steel,” *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 244, 2017, doi: 10.1088/1757-899X/244/1/012006.
 - [110] S. W. M. A. I. Senevirathne and H. K. G. Punchihewa, “Reducing surface roughness by varying aerosol temperature with minimum quantity lubrication

- in machining AISI P20 and D2 steels,” *Int. J. Manuf. Technol.*, vol. 94, pp. 1009–1019, 2018, doi: 10.1007/s00170-017-0951-4.
- [111] B. Cui, “Experimental Investigation of Surface Roughness in High Speed Turning of Hardened AISI P20 Steel,” *Adv. Mater. Res.*, vol. 418–420, pp. 1228–1231, 2012, doi: 10.4028/www.scientific.net/AMR.418-420.1228.
- [112] M. C. Cakir, C. Ensarioglu, and I. Demirayak, “Mathematical modeling of surface roughness for evaluating the effects of cutting parameters and coating material,” *J. Mater. Process. Technol.*, vol. 209, pp. 102–109, 2009, doi: 10.1016/j.jmatprotec.2008.01.050.
- [113] T. Özel and T. Altan, “Modeling of high speed machining processes for predicting tool forces, stresses and temperatures using FEM simulations,” in *Proceedings of the CIRP International Workshop on Modeling of Machining Operations*, 1998, pp. 225–234.
- [114] Q. Liu and Y. Altintas, “On-line monitoring of flank wear in turning with multilayered feed-forward neural network,” *Int. J. Mach. Tools Manuf.*, vol. 39, pp. 1945–1959, 1999.
- [115] A. Aggarwal, H. Singh, P. Kumar, and M. Singh, “Optimization of multiple quality characteristics for CNC turning under cryogenic cutting environment using,” *J. Mater. Process. Technol.*, vol. 205, pp. 42–50, 2008, doi: 10.1016/j.jmatprotec.2007.11.105.
- [116] A. Gupta, H. Singh, and A. Aggarwal, “Taguchi-fuzzy multi output optimization (MOO) in high speed CNC turning of AISI P-20 tool steel,” *Expert Syst. Appl.*, vol. 38, no. 6, pp. 6822–6828, 2011, doi: 10.1016/j.eswa.2010.12.057.
- [117] A. Qureshi, M. Sorte, and S. N. Teli, “Optimization of Cutting parameters for Surface roughness in CNC turning of P20 steel,” *Int. J. Sci. Eng. Res.*, vol. 6, no. 12, pp. 133–138, 2015.
- [118] Mitsubishi, “CVD Coated Grade for Steel Turning UE6110,” 2013.
- [119] J. Chen and L. Xue, “Microstructural characteristics of laser-clad AISI P20 tool steel,” in *The 1st ASM International Surface Engineering & the 13th IFHTSE Congress*, 2002, pp. 198–205.
- [120] V. Jakhar, M. Nayak, and N. Sharma, “A Literature Review on Optimization of Input Cutting Parameters for Improved Surface Finish in Turning Process,” *Int. Res. J. Eng. Technol.*, vol. 4, no. 3, pp. 2810–2815, 2017.
- [121] H. Akbari and O. Sezgen, “Analysis of energy use in building services of the industrial sector in California : two case studies,” *Energy Build.*, vol. 19, no. 2, pp. 133–141, 1992, doi: 10.1016/0378-7788(92)90007-4.
- [122] B. Smith, “Why is Surface Finish Important in Engineering Applications ?,” 2019. <https://www.azom.com/article.aspx?ArticleID=17627> (accessed Apr. 27, 2020).

- [123] B. Dehghan-manshadi, H. Mahmudi, A. Abedian, and R. Mahmudi, “A novel method for materials selection in mechanical design : Combination of non-linear normalization and a modified digital logic method,” *Mater. Des.*, vol. 28, pp. 8–15, 2007, doi: 10.1016/j.matdes.2005.06.023.
- [124] V. A. Balogun and P. T. Mativenga, “Modelling of direct energy requirements in mechanical machining processes,” *J. Clean. Prod.*, vol. 41, pp. 179–186, 2013, doi: 10.1016/j.jclepro.2012.10.015.
- [125] J. Lv, R. Tang, W. Tang, Y. Liu, Y. Zhang, and S. Jia, “An investigation into reducing the spindle acceleration energy consumption of machine tools,” *J. Clean. Prod.*, vol. 143, no. 1, pp. 794–803, 2017, doi: 10.1016/j.jclepro.2016.12.045.
- [126] S. Hu, F. Liu, Y. He, and T. Hu, “An on-line approach for energy efficiency monitoring of machine tools,” *J. Clean. Prod.*, vol. 27, pp. 133–140, 2012, doi: 10.1016/j.jclepro.2012.01.013.
- [127] P. S. Bilga, S. Singh, and R. Kumar, “Optimization of energy consumption response parameters for turning operation using Taguchi method,” *J. Clean. Prod.*, vol. 137, pp. 1406–1417, 2016, doi: 10.1016/j.jclepro.2016.07.220.
- [128] J. R. Gamage, A. K. M. Desilva, C. S. Harrison, and D. K. Harrison, “Process level environmental performance of electrodischarge machining of aluminium (3003) and steel (AISI P20),” *J. Clean. Prod.*, vol. 137, pp. 291–299, 2016, doi: 10.1016/j.jclepro.2016.07.090.
- [129] I. V. Bogatyreva, L. A. Ilyukhina, M. V. Simonova, and N. V. Kozhukhova, “Estimation of the Efficiency of Working Time Usage as a Factor of Sustainable Increase of Labor Productivity,” in *SHS Web of Conferences*, 2019, vol. 62, pp. 1–5, doi: 10.1051/shsconf/20196206002.
- [130] Dragon2000, “Labour Efficiency Explained,” 2017. <https://www.dragon2000.co.uk/labour-efficiency-explained/> (accessed Nov. 26, 2020).
- [131] H. H. Shahabi and M. M. Ratnam, “In-cycle monitoring of tool nose wear and surface roughness of turned parts using machine vision,” *Int. J. Adv. Manuf. Technol.*, vol. 40, pp. 1148–1157, 2009, doi: 10.1007/s00170-008-1430-8.
- [132] “Tungsten carbide.” https://en.wikipedia.org/wiki/Tungsten_carbide#cite_note-1 (accessed Aug. 15, 2020).
- [133] P. Mutukundu and Y. N. Rao K. V., “Experimental Study on Tool Parameters of Al₂O₃ in High Speed Machining,” *Int. J. Curr. Eng. Technol.*, vol. 5, no. 1, pp. 184–188, 2015.
- [134] M. Goedkoop, R. Heijungs, M. Huijbregts, A. De Schryver, J. Struijs, and R. Van Zelm, “ReCiPe 2008,” 2009.
- [135] M. A. J. Huijbregts *et al.*, “ReCiPe 2016 v1.1,” 2016.

- [136] A. Chandrakasan, S. Kumanan, and N. Sivakumaran, “Application of Grey Based Taguchi Method in Multi-Response Optimization of Turning Process,” *Adv. Prod. Eng. Manag.*, vol. 5, no. 3, pp. 171–180, 2010.
- [137] N. Radhika, G. K. Chandran, P. Shivaram, and K. T. V. Karthik, “Multi-Objective Optimization of EDM Parameters Using Grey Relation Analysis,” *J. Eng. Sci. Technol.*, vol. 10, no. 1, pp. 1–11, 2015.
- [138] O. Çakır, M. Kiyak, and E. Altan, “Comparison of gases applications to wet and dry cuttings in turning,” *J. Mater. Process. Technol.*, vol. 153–154, pp. 35–41, 2004, doi: 10.1016/j.jmatprotec.2004.04.190.
- [139] K. A. Risbood, U. S. Dixit, and A. D. Sahasrabudhe, “Prediction of surface roughness and dimensional deviation by measuring cutting forces and vibrations in turning process,” *J. Mater. Process. Technol.*, vol. 132, no. 1–3, pp. 203–214, 2003, doi: 10.1016/S0924-0136(02)00920-2.
- [140] Y. Kaynak, T. Lu, and I. S. Jawahir, “Cryogenic Machining-Induced Surface Integrity: A Review and Comparison with Dry, MQL, and Flood-Cooled Machining,” *Mach. Sci. and Technology*, vol. 18, no. 2, pp. 149–198, 2014, doi: 10.1080/10910344.2014.897836.
- [141] P. Sivaiah and D. Chakradhar, “Effect of cryogenic coolant on turning performance characteristics during machining of 17-4 PH stainless steel: A comparison with MQL , wet , dry machining,” *CIRP J. Manuf. Sci. Technol.*, vol. 21, pp. 86–96, 2018, doi: 10.1016/j.cirpj.2018.02.004.
- [142] H. K. Dave, L. S. Patel, and H. K. Raval, “Effect of machining conditions on MRR and surface roughness during CNC Turning of different Materials Using TiN Coated Cutting Tools – A Taguchi approach,” *Int. J. Ind. Eng. Comput.*, vol. 3, no. 5, pp. 925–930, 2012, doi: 10.5267/j.ijiec.2012.04.005.
- [143] World Data, “Energy consumption in Sri Lanka,” 2019. <https://www.worlddata.info/asia/sri-lanka/energy-consumption.php> (accessed Sep. 24, 2020).
- [144] T. T. Muthukumarana, H. P. Karunathilake, H. K. G. Punchihewa, and M. M. I. D. Manthilake, “Life cycle environmental impacts of the apparel industry in Sri Lanka : Analysis of the energy sources,” *J. Clean. Prod.*, vol. 172, pp. 1346–1357, 2018, doi: 10.1016/j.jclepro.2017.10.261.
- [145] R. J. Miller, H. S. Lenihan, E. B. Muller, N. Tseng, S. K. Hanna, and A. A. Keller, “Impacts of Metal Oxide Nanoparticles on Marine Phytoplankton,” *Environ. Sci. Technol.*, vol. 44, no. 19, pp. 7329–7334, 2010, doi: 10.1021/es100247x.
- [146] United States Environmental Protection Agency, “Energy and the Environment.” <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references> (accessed Dec. 08, 2020).