Hussien Hegab

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Google Scholar: https://scholar.google.com/citations?user=UU2tY8wAAAAJ&hl=en

Executive Summary

Strong background in modeling, simulation and optimization of advanced machining processes with 8 years of research and industrial experience in:

- Modeling, simulation and optimization of machining operations (traditional and non-traditional), especially for hard-to-cut materials.
- Finite element modeling of machining processes.
- Sustainability development and analysis of manufacturing systems with establishing a unique model for sustainable machining (https://www.sciencedirect.com/science/article/pii/S0959652617321996)
- Lean manufacturing, industrial planning and process improvements principles.
- Artificial intelligent applications in manufacturing engineering using different tools such as: artificial neural network, fuzzy logic, genetic programming and ANFIS.
- Application of cooling and lubrication in manufacturing processes including cryogenic cooling, minimum quantity lubrication, high-pressure coolant and nano-fluids.

I have published over 20 papers in tier 1 journals related to different topics such as: "Modeling and Optimization; Advanced Machining Processes; Sustainable Manufacturing; Nano-Cutting Fluid; Artificial Intelligent Applications in Manufacturing Engineering; Acoustic Emissions Analysis in Monitoring of Manufacturing Processes". Thus, my experience and skills are suited for today's R&D complexities.

Current Occupation

Visiting Research Associate at Aerospace Manufacturing Technologies Center-National Research Council of Canada, Montréal, Canada & Postdoctoral fellow at Mechanical Engineering Department-McGill university (October 2018 until now).

Assistant Professor (on—leave) at Cairo University, Mechanical Design and Production Engineering Department (Jan. 2012 until now).

Past Occupation

- Research associate at Machining Research Laboratory (June, 2018 until Sept. 2108): Faculty of Engineering and Applied Science, University of Ontario Institute of Technology, Canada.
- Teaching and research assistant (Sept., 2014 until May. 2108): Faculty of

Engineering and Applied Science, University of Ontario Institute of Technology, Canada.

- Research assistant at American University in Cairo (AUC) in Youssef Jamel Science and Technology Research Centre (STRC) (Part time, Jan. 2013 until May. 2014)
- Industrial engineer for lean manufacturing and processes improvements at 6th October Factory, MATC, Egypt (part-time, April 2013 until June 2014).
- Teaching and research assistant for industrial and manufacturing engineering courses, Mechanical Design and Production Engineering Department, Faculty of Engineering - Cairo University (Full time, Jan. 2012 until August. 2014).

Educational Information

Doctoral of Philosophy in Mechanical Engineering (Sept. 2014 until May, 2018): Faculty of Engineering and Applied Science, University of Ontario Institute of Technology, ON, Canada

- Graduate Courses: Finite Element in Mechanical Engineering/Advanced Engineering Design/Automotive Materials and Manufacturing/Sustainable Machining Processes/Advanced Acoustic and Noise Control
- GPA: 4.3 out of 4.3 (A+)
- Area of research: Sustainable Machining/Advanced Manufacturing/Nano-cutting Fluids Application/Machinability Improvements of Difficult-to-Cut Materials/Modeling and Optimization of Manufacturing Processes/Finite Element Analysis
- Title of Ph.D. Thesis: "Towards Sustainable Machining of Difficult-to-Cut Materials"

Master of Science: Mechanical Design and Production, Faculty of Engineering, Cairo University, Egypt (Sept. 2011 until June. 2014)

- Major: Mechanical Design and Production Engineering
- Minor: Industrial Engineering
- Graduate Courses: Modeling and Simulation of Manufacturing Systems, Computer Applications in Mechanical Design and Production, Advanced Operation Research, Quality Engineering, Statistical Analysis, Design of Experiments, and Metal Cutting Engineering.
- Title of M.Sc. Thesis: "Modeling and Optimization of Electrical Discharge Machining Using Statistical Design".

Bachelor of Science: Mechanical Design and Production, Faculty of Engineering, Cairo University, Egypt (Sept. 2006 until July. 2011)

- Major: Mechanical Design and Production Engineering
- Minor: Industrial Engineering
- Degree Evaluation: Very Good-Honor Degree
- Key Courses: Production Engineering I & II, Materials Science , Materials Engineering, Thermo-dynamics I & II, Fluid-Mechanics I & II, Stress Analysis, Machine Design I & II, Production Systems and Operational Management, Quality Control, Engineering Economy, Modeling and Simulation of Dynamic Systems, Robotics, Heat Transfer, Turbo-Machinery Systems, Computer-Aided-Design, Advanced Metal Forming, Advanced Metal Cutting, Welding Processes, Mechanical Vibrations, Automatic Control, Mechanical System Design, and Tribology.
- Capstone: Applying Industrial Engineering Techniques to Increase Utilization in Can

Manufacture Factory (Rexam Egypt, Sept, 2010 until June 2011).

Professional Experience

October 2018 until now: Visiting research associate at Aerospace Manufacturing Technologies Center at
National Research Council of Canada (NRC). I am mainly working on area of machining difficult-to-cut materials in terms of offering new designs/algorithms to model, simulate, assess, and optimize the machining processes. Currently, the main project is "Development of Machining Strategies for Low Machinability Powder Metallurgy Ni-Alloys" where **three well-known industrial partners (P&W-Canada/USA, SECO-Sweden and Element 6-Canada)** are participated in this project. His tasks includes selection of the proper tool material & geometry, cutting conditions as well as the appropriate cooling technique(s).

Sept. 2014 until Sept. 2018: Graduate Research Assistant at Machining Research Laboratory and Teaching Assistant at Faculty of Engineering and Applied Science/ University of Ontario Institute of Technology (UOIT). I have worked as TA in the following courses in term of supervising, marking assignments, leading tutorials or experimental labs:

- Manufacturing and Production Processes (MANE 3190U)
- Eng. Production Management (ENGR 3170U)
- Integrated Manufacturing systems (MANE3300U) as an ***instructor-B***
- Machine Design (MECE 3220U)
- Material Properties and Structure (MANE 2200U)
- Engineering Design (ENGR 1025U)
- Quality Control (MANE 4045U)
- Introduction to Engineering (ENGR 1015U)
- Mechanical Vibrations (MECE 3210U)
- Material Removal Processes (MANE 4190U)

Sept. 2011 until August 2014: Teacher assistant, Industrial Engineering Group, Mechanical Design and Production Department, Faculty of Engineering, Cairo University, Egypt. Taught the following courses more than once (work also included supervising/marking assignments, projects, and exams as well as assisting for teaching to students):

- Production and Operational Management, 4th year Mechanical Design and Production Engineering
- Quality Management, 3rd year Mechanical Design and Production Engineering
- Engineering Economy and Cost Accounting, 3rd year Mechanical Design and Production Engineering
- Engineering Drawing and Projection, 1st year Level
- Fundamental of Manufacturing Engineering, 1st year Level
- Production Engineering 2, 2nd year Aviation and Aerospace Department at Cairo University
- Mechanical Engineering (Robotics Section), 4th year Computer and Communication Engineering Program, Cairo University
- Joining Process Engineering, 2nd year Mechanical Engineering, Cairo University
- Fundamentals of Manufacturing Processes (MENG 3209), 3rd year level, Mechanical Engineering Program, The American University in Cairo (Jan. 2014 until May. 2014, as a visitor TA/RA)

Professional Experience in Industry

I have worked as an industrial engineer (in-training) in REXAM-EGYPT (**Sept, 2010 until June 2011**):

- Proposing an integrated scheduling software.
- Continuous improvements using work study principles & lean manufacturing tools.

I have worked as an industrial engineer for the following courses with an effective support in solving real industrial problems (**part-time, April 2013 until June 2014**):

- Introduction with Lean Manufacturing Course (6th October Factory, MATC, Egypt).
- Advanced Lean Manufacturing Course (6th October Factory, MATC, Egypt).
- Introduction with Industrial Planning and Process Improvement (includes background, and main design concepts).

I am currently working as research associate at NRC-Canada in an industrial project aiming to enhance the machinability of Ni-based alloys in collaboration with Pratt & Whitney Canada, Seco Tools-canada, and Element Six-Canada (**Full time, October 2018**):

- To investigate and optimize the machining strategies of this class of material, through the selection of tool material, tool geometry, cutting conditions and the variables of high pressure cooling (HPC). The optimization objective functions are the material removal rate, tool life, and surface integrity.

Eligible to be Professional Engineer, and Currently "Engineer in Training" in Professional Engineer Ontario (passed The Professional Practice Exam in December 2018). P.Eng license is expected to be received during mid of Decemeber-2019 or early of January, 2020.

Research Area of Interests

Modeling and Optimization; Advanced Machining Processes; Sustainable Manufacturing; Nano-Cutting Fluid; Artificial Intelligent Applications in Manufacturing Engineering; Acoustic Emissions Analysis in Monitoring of Manufacturing Processes.

Publications (>320 citations, H-index 11)

- Hegab, H., Gadallah, M. H., & Esawi, A. K. (2015). Modeling and optimization of Electrical Discharge Machining (EDM) using statistical design. Manufacturing Review, 2, 21. doi.org/10.1051/mfreview/2015023. **(Number of citations: 4, impact factor: 1.6).**
- Hegab, H. (2016). Design for additive manufacturing of composite materials and potential alloys: a review. Manufacturing Review, 3, 11. doi.org/10.1051/mfreview/2016010. **(Number of citations: 21, impact factor: 1.6).**
- Hegab, H., Deiab, I. M, & Kishawy, H. (2017). Modeling of Tool Wear in Turning of Ti-6Al-4V using Regression and Artificial Intelligence Techniques, the proceedings of the 6th International Conference on Virtual Machining Process Technology (Montreal, QC, Canada).

- Eltaggaz, A., Hegab, H., Deiab, I. M, & Kishawy, H. (2017). On using Nano-Cutting Fluid when Machining Austempered Ductile Iron (ADI), the proceedings of the 26th Canadian Congress of Applied Mechanics (Victoria, BC, Canada).
- Elkasaby, M., Hegab, H., Mohany, A., & Rizvi, G. M. (2017). Modeling and optimization of electrospinning of polyvinyl alcohol (PVA). Advances in Polymer Technology. doi.org/10.1002/adv.21869. **(Impact factor: 1.7).**
- Eltaggaz, A., Zawada, P., Hegab, H. A., Deiab, I., & Kishawy, H. (2017). Coolant strategy influence on tool life and surface roughness when machining ADI. The International Journal of Advanced Manufacturing Technology, 1-13. doi.org/10.1007/s00170-017-1088-1. **(Number of citations:19, impact factor: 2.7).**
- Hegab, H., Darras, B., & Kishawy, H. (2017). Towards Sustainability Assessment of Machining Processes. Journal of Cleaner Production, 170, 694-703. doi.org/10.1016/j.jclepro.2017.09.197. **(Number of citations: 25, impact factor: 7.09).**
- Hegab, H., Umer, U., Deiab, I., & Kishawy, H. (2018). Performance evaluation of Ti–6Al–4V machining using nano-cutting fluids under minimum quantity lubrication. The International Journal of Advanced Manufacturing Technology, 95(9-12), 4229-4241. doi.org/10.1007/s00170-017-1527-z. **(Number of citations: 29, impact factor: 2.7).**
- Hegab, H., Darras, B., & Kishawy, H. A. (2018). Sustainability assessment of machining with nano-cutting fluids. Procedia Manufacturing, 26, 245-254. doi.org/10.1016/j.promfg.2018.07.033. **(Number of citations: 14, impact factor: 1.58).**
- Fattahi, Z., Hegab, H., & Kishawy, H. A. (2018). Analytical prediction of delamination during drilling composite laminates. Procedia Manufacturing, 26, 237-244. doi.org/10.1016/j.promfg.2018.07.032. **(Number of citations: 4, impact factor: 1.58).**
- Hegab, H., Deiab, I. M, & Kishawy, H. (2018). Machining of Inconel 718 using Nano-Fluid Minimum Quaintly Lubrication, the proceedings of the 7th International Conference on Virtual Machining Process Technology (Hamilton, ON, Canada).
- Hegab, H., Umer, U., Soliman, M., & Kishawy, H. A. (2018). Effects of nano-cutting fluids on tool performance and chip morphology during machining Inconel 718. The International Journal of Advanced Manufacturing Technology, 96(9-12), 3449-3458. doi.org/10.1007/s00170-018-1825-0. **(Number of citations: 38, impact factor: 2.7).**
- Hegab, H., Kishawy, H. A., Gadallah, M. H., Umer, U., & Deiab, I. (2018). On machining of Ti-6Al-4V using multi-walled carbon nanotubes-based nano-fluid under minimum quantity lubrication. The International Journal of Advanced Manufacturing Technology, 97(5-8), 1593-1603. doi.org/10.1007/s00170-018-2028-4. **(Number of citations: 20, impact factor: 2.7).**
- Hegab, H., Abdelfattah, W., Rahnamayan, S., Mohany, A. & Kishawy, H. (2018). Multi-objective optimization during machining Ti-6Al-4V using nano-fluids, the proceedings of the Canadian Society for Mechanical Engineering International Congress 2018 (Toronto, ON, Canada).
- Eltaggaz, A., Hegab, H., Deiab, I., & Kishawy, H. A. (2018). Hybrid nano-fluid-minimum quantity lubrication strategy for machining austempered ductile iron (ADI). International Journal on Interactive Design and Manufacturing (IJIDeM), 12(4), 1273-1281. doi.org/10.1007/s12008-018-0491-7. **(Number of citations:13, impact factor: 1.87)**
- Kishawy, H. A., Hegab, H., Umer, U., & Mohany, A. (2018). Application of acoustic emissions in machining processes: analysis and critical review. The International Journal of Advanced Manufacturing Technology, 98(5-8), 1391-1407.

doi.org/10.1007/s00170-018-2341-y. **(Number of citations: 4, impact factor: 2.7).**

- Hegab, H., Kishawy, H. A., & Darras, B. (2019). Sustainable Cooling and Lubrication Strategies in Machining Processes: A Comparative Study. Procedia Manufacturing, 33, 786-793. doi.org/10.1016/j.promfg.2019.04.099. **(Number of citations: 1, impact factor: 1.58).**
- Hegab, H., & Kishawy, H. (2018). Towards Sustainable Machining of Inconel 718 Using Nano-Fluid Minimum Quantity Lubrication. Journal of Manufacturing and Materials Processing, 2(3), 50. doi.org/10.3390/jmmp2030050. **(Number of citations: 13).**
- Kishawy, H., Hegab, H., & Saad, E. (2018). Design for Sustainable Manufacturing: Approach, Implementation, and Assessment. Sustainability, 10(10), 3604. doi.org/10.3390/su10103604. **(Number of citations: 12, impact factor: 2.85).**
- Ahmed, N, Hegab, H., & Mansi, A. (October, 2018). Corporate Social Responsibility in the Manufacturer Supply Chain of the Luxury Fashion Industry, the Proceedings of 3rd North American IEOM Conference (Washington DC, USA).
- Hegab, H., Kishawy, H. A., Umer, U., & Mohany, A. (2019). A model for machining with nano-additives based minimum quantity lubrication. The International Journal of Advanced Manufacturing Technology, 1-16. doi.org/10.1007/s00170-019-03294-0. **(Number of citations: 5, impact factor: 2.7).**
- Hegab, H., Hosseini, A, Deiab, I. M, & Kishawy, H. (2017). Sustainability Analysis of Ti-6Al-4V Machining Using Statistical Design Methods: Effects of Cooling Techniques and Machining Strategies. International Journal of Sustainable Manufacturing (Accepted-In press).
- Jamil, M., Khan, A. M., Hegab, H., Gong, L., Mia, M., Gupta, M. K., & He, N. (2019). Effects of hybrid Al_2O_3-CNT nanofluids and cryogenic cooling on machining of Ti–6Al–4V. The International Journal of Advanced Manufacturing Technology, 102(9-12), 3895-3909. doi.org/10.1007/s00170-019-03485-9. **(Number of citations: 10, impact factor: 2.7).**
- Sharma, N., Singh, G., Hegab, H., Mia, M., & Batra, N. K. (2019). Tribo-corrosion characterization of NiTiCu alloy for bio-implant applications. Materials Research Express, 6(9), 096526. doi.org/10.1088/2053-1591/ab2d95. **(Impact factor: 1.44).**
- Sharma, N., Singh, G., Gupta, M., Hegab, H., & Mia, M. (2019). Investigations of surface integrity, bio-activity and performance characteristics during wire-electrical discharge machining of Ti-6Al-7Nb biomedical alloy. Materials Research Express, 6(9), 096568. doi.org/10.1088/2053-1591/ab3094. **(Impact factor: 1.44).**
- Salem, A., Hegab, H., Rahnamayan, S. & Kishawy, H. (2019). Multi-objective Optimization During Sustainable Machining of Difficult-to-Cut Materials. The Joint Canadian Society for Mechanical Engineering and CFD Society of Canada International Congress.
- Kishawy, H., Hegab, H., Hosseini, A. & Saad, E. Towards cleaner and sustainable manufacturing processes: a framework. 8th Global Conference on Global Warming (GCGW-2019).
- Eltaggaz, A., Hegab, H. & Deiab, I. (2019). Sustainability Assessment of Machining Difficult-to-Cut Materials. The Joint Canadian Society for Mechanical Engineering and CFD Society of Canada International Congress.
- Kishawy, H. A., Hegab, H., Deiab, I., & Eltaggaz, A. (2019). Sustainability Assessment during Machining Ti-6Al-4V with Nano-Additives-Based Minimum Quantity Lubrication. Journal of Manufacturing and Materials Processing, 3(3), 61. doi.org/10.3390/jmmp3030061. **(Number of citations: 1).**

- Jamil, M.; Khan, A.M.; Hegab, H.; Sarfraz, S.; Sharma, N.; Mia, M.; Gupta, M.K.; Zhao, G.; Moustabchir, H.; Pruncu, C.I. Internal Cracks and Non-Metallic Inclusions as Root Causes of Casting Failure in Sugar Mill Roller Shafts. Materials 2019, 12, 2474. doi.org/10.3390/ma12152474. **(Impact factor: 2.97).**
- Abbas, A. T., Gupta, M. K., Soliman, M. S., Mia, M., Hegab, H., Luqman, M., & Pimenov, D. Y. (2019). Sustainability assessment associated with surface roughness and power consumption characteristics in nanofluid MQL-assisted turning of AISI 1045 steel. The International Journal of Advanced Manufacturing Technology, 1-17. doi.org/10.1007/s00170-019-04325-6. **(Impact factor: 2.7).**
- Gupta, M. K., Jamil, M., Wang, X., Song, Q., Liu, Z., Mia, M., & Imran, G. M. (2019). Performance Evaluation of Vegetable Oil-Based Nano-Cutting Fluids in Environmentally Friendly Machining of Inconel-800 Alloy. Materials, 12(17), 2792. doi.org/10.3390/ma12172792. **(Impact factor: 2.97).**
- Said, Z., Gupta, M., Hegab, H. et al. Int J Adv Manuf Technol (2019). https://doi.org/10.1007/s00170-019-04382-x. **(Impact factor: 2.7).**
- Abbas, A.T.; Benyahia, F.; El Rayes, M.M.; Pruncu, C.; Taha, M.A.; Hegab, H. Towards Optimization of Machining Performance and Sustainability Aspects when Turning AISI 1045 Steel under Different Cooling and Lubrication Strategies. Materials 2019, 12, 3023. **(Impact factor: 2.97).**

Under Review

- Hegab, H., Umer, U., Deiab, I., & Kishawy, H. (2018). On Machining of Inconel 718 using Nano-additives Based Minimum Quantity Lubrication. Journal of Manufacturing Processes.
- Hegab, H., Kishawy, H., Esawi, A. (2019). Tribological aspects of nano-fluid minimum quantity lubrication: a comparative performance analysis between multi walled-carbon nano-tubes and aluminum oxide nano-particles. International Journal of Mechanical Sciences.

Research and Industrial Projects

- **Development of Machining Strategies for Low Machinability Powder Metallurgy Ni-Alloys**, McGill University, NRC-Canada, Pratt & Whitney Canada, Seco Tools-Canada, and Element Six-Canada **(October. 2018 until October 2019).**
- **Development of Sustainable Machining of Difficult-to-Cut Materials Using Nano-Cutting Fluids**, Association of Egyptian-American Scholars-JESOR (a collaborative project between University of Ontario Technology and American University in Cairo) **(Sept. 2108 until Sept. 2020).**
- Accelerating Digital Technology Adoption in Canadian Companies (Adopt-IT) between Ryerson University, Simon Fraser University & UOIT "**ADOPT-IT Manufacturing & Technology Focus Group Report" (Sept. 2016 until November 2016).**

Training, Activities, and Awards

- Training: Town gas Company (Distribution Natural gas Cairo), Egypt (June 2007 until August 2007)
- Training: OTIS Company for Lifters, Egypt (June 2008 until August 2008)
- Training: Universal Feeding Factory, Egypt (Feb. 2010 until May 2010.)

- Training: Rexam Egypt Factory (Can Manufacturing), Egypt (Sept. 2010 until April 2011)
- Training: Faculty and Leadership Development Courses, Cairo University, Egypt, (Feb. 2011 until May 2013)
- Training: Graduate professional skills workshops, UOIT, Canada (Sept. 2014 until December 2014)
- Training: Workplace Hazardous Materials Information System (WHMIS) Training, October, 2014
- Training: Visiting research assistant at Advanced Manufacturing Laboratory/University of Guelph (June. 2016 until August 2016)
- Activity: (ASME) student professional development conference held in Cairo University on 2010, sponsored by (Schlumberger)
- Activity: Participating in ABU-ROBOCON-2010 (local version), and achieved 6th place (Asian Oceania College robot competition, and it aims to compete robots to complete a task within a set period of time)
- Activity: Electing as vice-president of graduate student council at UOIT (gsc7), 2015/2016
- Activity: Electing as president of graduate student council at UOIT (gsc10), 2018
- Activity: Graduate student's representative-FEAS/UOIT, 2018
- Awards: Schlumberger Students Awards for the Outstanding achievement for academic year 2009/2010 (Top 5 Third year, Mechanical Design and Production, Egypt)
- Awards: Schlumberger Students Awards for best Graduation Project for academic year 2010/2011
- Awards: IEEE Award for best design idea at ROBOCON-Egypt 2010
- Scholarships: Graduation Award for outstanding academic performance, Cairo University, 2011
- Scholarships: Graduate and Teaching research assistantship from UOIT, 2014
- Scholarships: UOT Dean's scholarship (In-program scholarship), 2015
- Scholarships: FEAS-UOTI Scholarship for best graduate students
- Postdoctoral fellowship from MITACS-Canada (2018-2019).

Computer, and Software Qualifications

- MATLAB
- Visual Basic
- Solid Works
- Modeling using NX
- CNC Machine Coding (G-code)
- ARENA for Simulation, Modeling and Analysis of Manufacturing Systems
- ABAQUS for finite element analysis (FEA)
- ANSYS Fluent
- 3-D Deform for machining processes
- MS Word, MS Excel, PowerPoint and proficient in all Windows versions
- Computer hardware installation and Basics of Computer Network Installation