Amir Malakizadi, Ph.D.

+46(0)31 7726377 +46(0)70 9450104
amir.malakizadi@chalmers.se

Research and Education

Senior Researcher – Associate Professor (Docent) *Sep. 2020 – Present*
Chalmers University of Technology — Gothenburg, Sweden

Deputy Director of Centre for Metal Cutting Research (MCR) *Jan. 2019 – Present*
Chalmers University of Technology — Gothenburg, Sweden

Researcher *Feb. 2018 – Sep. 2020*
Chalmers University of Technology — Gothenburg, Sweden

Visiting Researcher *Sep. 2017 – Dec. 2019*
Sandvik Coromant AB — Sandviken, Sweden

Post-Doctoral Researcher *Nov. 2015 – Feb. 2018*
Chalmers University of Technology — Gothenburg, Sweden

Ph.D. in Materials Science *Jan. 2011 – Nov. 2015*
Chalmers University of Technology — Gothenburg, Sweden
Thesis: *Optimisation of Machining Operations by means of Finite Element Method and Tailored Experiments*

M.Sc. in Materials Science, Advanced Engineering Materials *Sep. 2008 – Nov. 2010*
Chalmers University of Technology — Gothenburg, Sweden
Thesis: *Simulation of cooling behavior and microstructure development of PM steels*

B.Sc. in Materials Engineering, Industrial Metallurgy *Sep. 2002 – Mar. 2008*
Amirkabir University of Technology (Tehran Polytechnic) — Tehran, Iran

Work Experience

Design Analyst *Feb.2006 – Aug.2008*
CAE Department, Iran Heavy Diesel Engine — Tehran, Iran

Manufacturing & Design Analyst *Jul. 2004 – Dec. 2004*
Deghat Machine Asia — Tehran, Iran

Organisational Experience

- Acted as representative of the Department of Materials and Manufacturing Technology to the Doctoral Student (DS) Guild. Involved in several tasks, including the selection of the "**Supervisor of the Year**", 2013/2014.
- Supervision of 15 M.Sc. and exchange students (B.Sc. and M.Sc.) in the field of metal cutting research since 2012.
- Co-supervision of a Ph.D. student enrolled in McGuide, a Vinnova-funded FFI project.
- Lab and tutorial developments for two courses between 2013 and 2015.
- WP leader in four Swedish Vinnova-funded projects since June 2017: **WEAR-FRAME, SUSTAIN-CRYO, HYBRIDSURF, MACGUIDE**. Coordination of **WEAR-FRAME** project.
- Represent IMS in **PMH application lab** and lead research activities related to tool and material characterisation and cutting simulation.
- Reviewer of scientific journals: *Wear*, *Journal of Manufacturing Processes*, *Journal of Manufacturing Science and Engineering*, *Journal of Engineering Tribology, International Journal of Advanced Manufacturing Technology*, *International Journal of Machine Tools and Manufacture*, *Journal of Machining Science and Technology*.

- Completed the Teaching, Learning and Evaluation (**FCIU101**) and Supervising Research Students (**CLS905**) courses.
- Co-chaired DMMS-MCR member conference with emphasis on “Advanced component manufacturing in a digital era – the future of machining and industrial metrology” jointly with Prof. Andreas Archenti from KTH Royal Institute of Technology, Fall 2019.
- Chair the organising committee of the **CIRPe** conference with emphasis on “*Material aspects of manufacturing processes*”, will be hosted by Chalmers University of Technology, Fall 2022.

Teaching Experience

1. Developed four sets of lab instructions and tutorials for two courses between 2013 and 2015, as teaching assistant.
   - Semi-analytical calculation of forces in orthogonal cutting (MTT107)
   - Simulation of materials processing: FE modelling of the quenching process of a cylindrical bar (MMK231)
   - Simulation of materials processing: FE modelling of cutting process (MTT107)
   - Procedure for systematic manual point counting: comparison with image processing (MMK231)
2. Lecture on machinability of difficult-to-cut materials, surface integrity in metal cutting and FE modelling of machining processes externally at Sandvik Coromant within the MCR training programme (under Chalmers Professional Education programme), since 2015.
3. Lecture on machinability of difficult-to-cut materials in MPR034–Manufacturing processes, since 2016.
4. Lecture on fundamentals of machining processes, modelling and simulation of cutting processes, machinability of ferrous, non-ferrous and difficult-to-cut materials in Metal Cutting–MTT107, since 2016.
5. Lectured and ran tutorials on FE modelling of the metal cutting processes at University West, Sweden, 2019 and 2020.
6. Lecture on post-processing of AM materials in Additive Manufacturing–MTT125.
7. Co-ordinator of Materials Selection and Design–MMK221, 2016.
8. Co-ordinator of Metal Cutting–MTT107, since September 2018.
9. Examiner of Metal Cutting–MTT107, since January 2020.

Research Grants

- A framework for the physics-based estimation of tool wear in machining process (**WEAR-FRAME**), funded by Vinnova under Metalliska Material programme.

  Contribution and role:

  Wrote the proposal during my post-doctoral fellowship and co-ordinated the research activities. Officially the work-package leader of modelling and simulation activities.

- Green manufacturing: Creating high strength metal matrix structures (**HYBRIDSURF**), funded by Vinnova.

  Contribution and role:

  Work-package leader of modelling and simulation portions and wrote portions of the proposal associated with modelling.

- A simulation-based guide for machinability assessment (**McGuide**), funded by Vinnova under the Strategic Vehicle Research and Innovation programme (FFI).

  Contribution and role:

  Officially the work-package leader of experimental activities and co-supervise the PhD student enrolled in this project. Also support the tool-wear simulation activities.

- Transitioning to sustainable production–cryogenic manufacturing processes (**SUSTAIN-CRYO**), funded by Vinnova under Strategic Vehicle Research and Innovation programme (FFI).

  Contribution and role:

  Officially the work-package leader of modelling and simulation and wrote parts in the proposal associated with modelling. Also support the experimental activities related to tool wear analysis.

- Characterisation of clean steels for future powertrain production, funded via PMH Application Lab, KTH, Stockholm.

  Contribution and role:

  Officially the work-package leader of work material and tool wear characterisation. The other research partners were Fraunhofer IPT (co-ordinator) and Fraunhofer IWU.

- Robust and economic chip-breaking, funded via PMH Application Lab, KTH, Stockholm.

  Contribution and role:

  Officially the work-package leader of work material and tool wear characterisation. The other research partner (co-ordinator) was Fraunhofer IWU.

- Deep-hole drilling, funded via PMH Application Lab, KTH, Stockholm.

  Contribution and role:

  Officially the work-package leader of workpiece material and tool wear characterisation and FE modelling of drilling process. The research partners were Fraunhofer IWU (co-ordinator), KTH and Fraunhofer IPT.

- Adaptive cylinder block machining – live optimization, funded via PMH Application Lab, KTH, Stockholm.

  Contribution and role:

  Officially the work-package leader of work material and tool wear characterisation. The research partners were Fraunhofer IWU (co-ordinator) and Fraunhofer IPT.

Supervision Experience

Master's Theses Examined at Chalmers University of Technology

1. Saeed Azimi, Experimental study of orthogonal metal cutting on CGI having different micro-constituents, Chalmers University of Technology, 2012.
2. Mohammad Rezazadeh Bina, Development of 2D-Machining test for assessing material properties in metal cutting, Chalmers University of Technology, 2013.
3. Sujithguru Loganathan, Performance study of Ceramic tools in Machining hypo-eutectoid steels with intermittent soft and induction hardened regions, Chalmers University of Technology, 2014.
4. Carsten Behring, Investigation on machinability of solution-hardened compacted graphite iron, Chalmers University of Technology, 2015.
5. Hans Gruber, Flank wear behavior of cemented carbide tools when machining case hardening steels, Chalmers University of Technology, 2015.
6. Alexander T. Bengtsson and Daniel Johansson, Material affecting cutting forces, Chalmers University of Technology, 2019.
7. Tyrone Julius Machado, Machinability of crankshaft steel: on the influence of batch-to-batch material variations, Chalmers University of Technology, 2019.
8. Roman Kalkavan, Sustainable manufacturing: Metal cutting fluid – From mineral oil to vegetable oil, Chalmers University of Technology, 2020.
9. Tina Hajali, Influence of microstructure and heat treatment on tool wear when machining wrought and additively manufactured Alloy 718, Chalmers University of Technology, in progress, *expected examination date: August 2020*.

Exchange Student Projects at Chalmers University of Technology

1. Pietro Stuppa, Characterisation of wear mechanisms when machining Ni-based superalloys with cemented carbide tools, Università di Bologna, 2017.
2. Georg Joachim Schnalzger, Calculation of chemical solubility of selected binary compounds A_aB_b applied in cutting tool in pure iron and iron-based alloys by using Thermo-Calc software, University of Leoben, 2017.
3. Mats Rudolf, Experimental tool wear investigations when machining tool steel and stainless steel using coated and uncoated cemented carbide tools, ETH Zurich, 2018.
4. Sven Friebe, Metallographic investigation of the effect of the microstructure of Vanadis 10 and 316L on the wear behavior of uncoated inserts, Leibniz Universität Hannover, 2018.
5. Jannick Nils Oberbeck, Effects of tool geometry and cutting conditions on chip formation when machining 316L austenitic stainless steel, ETH Zurich, 2018.

Publications

Journal Papers (Peer-Reviewed):

1. Ertürk AS, ***Malakizadi A***, Larsson R. A thermomechanically motivated approach for identification of flow stress properties in metal cutting. The International Journal of Advanced Manufacturing Technology. 2020:1-4.
   https://doi.org/10.1007/s00170-020-06121-z
2. ***Malakizadi A***, Shi B, Hoier P, Attia H, Krajnik P. Physics-based approach for predicting dissolution–diffusion tool wear in machining. CIRP Annals. 2020.
   https://doi.org/10.1016/j.cirp.2020.04.040
3. Razanica S, ***Malakizadi A***, Larsson R, Cedergren S, Josefson BL. FE modeling and simulation of machining Alloy 718 based on ductile continuum damage. *International Journal of Mechanical Sciences*. 2020; 171:105375.
   https://doi.org/10.1016/j.ijmecsci.2019.105375
4. Hoier P, ***Malakizadi A***, Klement U, Krajnik P. Characterization of abrasion- and dissolution-induced tool wear in machining. *Wear.* 2019; 426:1548–62.
   https://doi.org/10.1016/j.wear.2018.12.015
5. Hoier P, ***Malakizadi A***, Friebe S, Klement U, Krajnik P. Microstructural variations in 316L austenitic stainless steel and their influence on tool wear in turning. *Wear*. 2019; 428: 315–327.
   https://doi.org/10.1016/j.wear.2019.02.024
6. ***Malakizadi A***, Ghasemi R, Behring C, Olofsson J, Jarfors AEW, Nyborg L, Krajnik P. Effects of workpiece microstructure, mechanical properties and machining conditions on tool wear when milling compacted graphite iron. *Wear*. 2018; 410–411: 190–201.
   https://doi.org/10.1016/j.wear.2018.07.005
7. Hoier P, ***Malakizadi A***, Stuppa P, Cedergren S, Klement U. Microstructural characteristics of Alloy 718 and Waspaloy and their influence on flank wear during turning. *Wear*. 2018; 400:184–93.
   https://doi.org/10.1016/j.wear.2018.01.011
8. ***Malakizadi A***, Hosseinkhani K, Mariano E, Ng E, Del Prete A, Nyborg L. Influence of friction models on FE simulation results of orthogonal cutting process. *The International Journal of Advanced Manufacturing Technology*. 2017; 88 (9–12):3217–32.
   https://doi.org/10.1007/s00170-016-9023-4
9. ***Malakizadi* A**, Gruber H, Sadik I, Nyborg L. An FEM-based approach for tool wear estimation in machining. *Wear*. 2016; 368:10–24.
   https://doi.org/10.1016/j.wear.2016.08.007
10. Nikas D, Ahlström J, ***Malakizadi A***. Mechanical properties and fatigue behaviour of railway wheel steels as influenced by mechanical and thermal loadings. *Wear*. 2016; 366:407–15.
    https://doi.org/10.1016/j.wear.2016.04.009
11. ***Malakizadi A,*** Cedergren S, Sadik I, Nyborg L. Inverse identification of flow stress in metal cutting process using Response Surface Methodology. *Simulation Modelling Practice and Theory*. 2016; 60:40–53.
    https://doi.org/10.1016/j.simpat.2015.09.009
12. Hatami S, ***Malakizadi A***, Nyborg L, Wallin D. Critical aspects of sinter-hardening of prealloyed Cr–Mo steel. Journal of Materials Processing Technology. 2010; 210(9):1180–9.
    https://doi.org/10.1016/j.jmatprotec.2010.03.002

CIRP and ASME Conference Proceedings (Peer-Reviewed):

13. ***Malakizadi A***, Oberbeck JN, Magnevall M, Krajnik P. A new constitutive model for cutting simulation of 316L austenitic stainless steel. *Procedia CIRP*. 2019; 82:53–8.
14. Hoier P, ***Malakizadi A***, Krajnik P, Klement U. Study of flank wear topography and surface-deformation of cemented carbide tools after turning Alloy 718. *Procedia CIRP*. 2018; 77:537–40.

15. Isakson S, Sadik MI, ***Malakizadi A***, Krajnik P. Effect of cryogenic cooling and tool wear on surface integrity of turned Ti-6Al-4V. *Procedia CIRP*. 2018; 71:254–9.
16. Sadik M.I., Isakson S, ***Malakizadi A***, Nyborg L. Influence of coolant flow rate on tool life and wear development in cryogenic and wet milling of Ti-6Al-4V. *Procedia CIRP*. 2016; 46:91–4.
17. ***Malakizadi, A*****,** Sadik, I, Nyborg, L. Wear mechanism of CBN inserts during machining of bimetal aluminum-grey cast iron engine block. *Procedia CIRP*. 2013; 8:187–192.
18. Chamani H, ***Malakizadi A***. High cycle fatigue life assessment of a heavy duty diesel engine cylinder head. *ASME Internal Combustion Engine Division Fall Technical Conference*. 2009; 543–552.
19. Jafarabadi M, Chamani H, ***Malakizadi A***, Jazayeri S. A fast coupled CFD-thermal analysis of a heavy duty diesel engine water cooling system. *ASME International Mechanical Engineering Congress and Exposition*. 2008; 10: 663-670.
20. ***Malakizadi A,*** Chamani H, Shahangian S, Jazayeri S, Sattarifar I. Thermo-mechanical fatigue life prediction of a heavy duty diesel engine liner. *ASME Internal Combustion Engine Division Fall Technical Conference*. 2007: 529–535.

Other Conference Papers:

21. Hoier P, ***Malakizadi A***, Krajnik P, Klement U. A comparative study of flank wear characteristics when turning 20MnCrS5 case hardening steel and Alloy 718 superalloy. *The 18th Nordic Symposium on Tribology – NORDTRIB*. 2018.
22. ***Malakizadi, A*****,** Cedergren, S, Surreddi, KB, Nyborg, L. A methodology to evaluate the machinability of Alloy 718 by means of FE simulation. *International Conference on Advanced Manufacturing Engineering and Technologies, NEWTECH.* 2013.

Presentations and workshops

- ***Malakizadi, A*****,** Mehrgou, M, Educational workshop on crankshaft design in heavy-duty diesel engines in 5th Conference on Internal Combustion Engines, Tehran, Iran, 2007.
- ***Malakizadi, A*****,** Simulation strategies for tool wear prediction, Production R&D Cluster conference, Katrineholm, Sweden, 2018.
- ***Malakizadi, A*****,** A platform for simulation of surface integrity in machining, DMMS-MCR member conference, KTH, Sweden, 2019.
- ***Malakizadi, A*****,** Brohede, U, Educational workshop on machining compacted graphite iron (CGI), Metals Research Institute Swerim, Stockholm, Sweden, 2019.
- ***Malakizadi, A***, Hoier, P, Mallipeddi, D, Klement, U, Krajnik, P, A platform for tool wear prediction in machining Part 1: characterisation, Technical presentation: *CIRP General Assembly STC-C*. Birmingham, UK, 2019.

Honours and Awards

- Research Affiliate of the International Academy for Production Engineering (CIRP) since Feb. 2018 (Valid until 2021).
- Royal Swedish Academy of Engineering Sciences: The Jacob Wallenbergs Foundation, December 2015.
- National heat winner for Sweden in the euspen International Challenge, 2015.

Computer Skills

FEM and CAD Software

- ANSYS (Advanced proficiency)
- DEFORM-2D/3D (Advanced proficiency)
- ABAQUS (Basic proficiency)
- ANSYS-LS DYNA (Intermediate proficiency)
- CATIA V5R17 (Advanced proficiency in solid, surface and assembly modules)

Programming Languages

- MATLAB (Advanced proficiency)
- Fortran 90 (Intermediate proficiency)
- APDL: ANSYS Parametric Design Language (Advanced proficiency)

Other Software

- ThermoCalc (Advanced proficiency)
- Dictra (Intermediate proficiency)
- JMatPro (Advanced proficiency)
- MedeA: VASP and LAMMPS (Basic proficiency)

Other Skills

- CNC programming required for experimental machining tests and sample preparations
- Advanced material characterisation techniques:
    - SEM/EDS
    - EBSD