Mahmoud Ahmed Essam Mohammed
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Personal Statement:

I am a mechanical engineer and researcher specializing in advanced materials, casting, and heat treatment. With a Ph.D. in Mechanical Design and Production Engineering, I have published extensively on tool steels, compacted graphite iron, and hybrid materials. I currently serve as Assistant Professor at HTI , R&D Manager at N-MCV and manager of the foundry at the Engineering Company for Industrial Services focusing on industrial innovation and materials performance. My goal is to bridge research and real-world applications, especially in automotive and sustainable technologies.

Education:

- Doctor of Philosophy in mechanical design and production engineering, Cairo University **2023**.Under the title of **"**Effect of Heat Treatment and Alloying Elements on Microstructure and Mechanical Properties of Cold Work Shock Resisting Tool Steel**"**.
- Master degree of science in mechanical design and production engineering, **2018**, Cairo University. Under the title of **"**Design of Compacted Graphite Cast Iron Diesel Engine Block and Its Properties**"**. Synthesis of compacted graphite cast iron by adding ferrotitanium alloy and pure tin to control the percentage of CGI (< 20% nodularity and > 85% pearlite) to be suitable for diesel engine block application. Design and implementing for producing engine block was conduct(pattern and core boxes, gating system design, control of pouring time, mechanical tests and investigation, machining)
- FE/EIT certificate (Fundamentals of engineering exam), **2018**.
- B.SC in mechanical engineering; Higher Technological Institute (HTI), Tenth of Ramadan City, **2013**, Grade: Excellent honours (GPA 3.87/4).

Key Modules:

Engineering materials – Composite materials – Powder metallurgy – Abaqus (Finite Element Tool) - Computer applications in mechanical design and production – Solid mechanics - Dynamic system analyses.

Research Interest:

Material engineering characterization and performance for ferrous and non-ferrous alloys to improve different application, innovation of metallurgical solutions for engineering problems, casting, material characterization, mechanical testing.

Research project:

- Study of wear and mechanical properties for automotive braking pad.
- Design of Compacted Graphite Cast Iron Diesel Engine Block.
- Development of IC Engine connecting rod materials.
- Development of IC Engine piston Materials.
- Bi-material synthesis by centrifugal casting.
- Enhancing of mechanical properties for shock resisting tool steel.
- Supervisor in electrical car for Apex team in HTI, that participate in EVER Egypt, 2018 and 2019.
- Beta Sterling Engine.

Research skills:

- Casting techniques (gating system design, design of casting pattern and core).
- Material characterization (Tensile and compression tests, hardness test, microstructure investigation, damping capacity, XRD and EDAX analyses, Wear analysis).
- Working to solve problems arising during the manufacturing process or with the finished product, such as those caused by casting process.

Research Publication:

1- **Essam, M.A.,** Abdeltawab, N.M., Balata, A.M., Shash, A.Y., El-Sayed, M.M. **(2025).** Simulation of Energy Harvesting by Using Piezoelectric Materials. In: Öchsner, A., Altenbach, H. (eds) Engineering Design Applications VII. Advanced Structured Materials, vol 230. Springer, Cham. https://doi.org/10.1007/978-3-031-84346-4_34

2- M. M. El-Sayed, A. Y.Shash, N. M. Abd Eltawab, **M. A. Essam**, Materialwiss. Werkstofftech. **2025**, 56, e202400353. https://doi.org/10.1002/mawe.202400353

3- **Essam, M.A.**, Faragallah, M.M., Magdy, M. et al. Effect of sliding velocity, load, and RPM on wear and friction in automotive brake pads. Discov Appl Sci 7, 453 **(2025).** https://doi.org/10.1007/s42452-025-06925-2

4- M.Faragallah, M., Metered, H., Abdelghany, M.A., and **Essam, M.A.**, "Artificial Intelligence Technique Applied to Semi-ActiveVibration Control in Vehicle Suspension System," SAE Technical Paper 2025-01-8270, **2025**, doi:10.4271/2025-01-8270.

5- M.Faragallah, M., Metered, H., and **Essam, M.A.**, "Vibration Mitigation of Semi-Active Vehicle Suspension System Incorporating Magnetorheological Damper Using Hybrid Control," SAE Technical Paper 2025-01-8269, **2025**, doi:10.4271/2025-01-8269.

6- Basem, Ahmed, **Mahmoud A. Essam**, and Ahmed Y. Shash. "Modeling and Design of Guillotine Cutting of a Cold Working Steel Sheet by Using FEM." In *Engineering Design Applications V: Structures, Materials and Processes*, pp. 317-329. Cham: Springer Nature Switzerland, **2023.**

7- **Essam, M.A.**; Shash, A.Y.; El-Fawakhry, M.K.; El-Kashif, E.; Megahed, H. Effect of Deep Cryogenic Treatment on Wear Behavior of Cold Work Tool Steel. Metals **2023**, 13, 382. https:// doi.org/10.3390/met13020382.

8- **Essam, Mahmoud A.,** et al. "Influence of micro-alloying elements and deep cryogenic treatment on microstructure and mechanical properties of S5 cold work shock resisting tool steel." Results in Materials **(2023):** 100374.

9- Magdy, M., Abdelhamed, O., **Essam, M.A.**, Abdeltawab, N.M., Shash, A.Y. **(2022).** Design and Manufacturing of an IC and Electrical Engine Race Car. In: Öchsner, A., Altenbach, H. (eds) Engineering Design Applications IV. Advanced Structured Materials, vol 172. Springer, Cham. https://doi.org/10.1007/978-3-030-97925-6_10.

10- **Essam, M. A.,** Shash, A. Y., Megahed, H., & El-Kashif, E. **(2021).** Effect of section thickness on microstructure and mechanical properties of compacted graphite iron for diesel engine applications. *Heliyon*, *7*(1), e05930.

11- Megahed, H., El-Kashif, E., Shash, A. Y., & **Essam, M. A. (2019).** Effect of holding time, thickness and heat treatment on microstructure and mechanical properties of compacted graphite cast iron. Journal of Materials Research and Technology, 8(1), 1188-1196.

Conference:

1- Participating in the AUTOTECH 2023 conference as a speaker under the title of Diesel Engine Industry Technology, **October 2023**.

2- 2nd Global Forum for Higher Education and Scientific Research (GFHS) in Egypt, Taking place from the 8th to 10th of December **2021**.

3- 14th International Conference on Advanced Computational Engineering and Experimenting (**ACEX2021**) from 5-9 July 2021, under the title: Design and Manufacture of Hybrid Racing Tricycle.
4- 12th International Egyptian conference in metal casting (**EGYCAST 2019**) from period 8-11 November 2019, under the title: Effect of Section Thickness on Microstructure and Hardness of Compacted Graphite Cast Iron.

Work Experience:

1- Assistant professor, Department of Mechanical Engineering at Higher Technological Institute (HTI), Tenth of Ramadan City from september 2023 to present.
2- Manager of the research and development sector at the National Company for Transportation Industry (N-MCV) from september 2023 to present.
3- Manager of the foundry at the Engineering Company for Industrial Services from November 2021 to present.
4- Teaching Assistant, Department of Mechanical Engineering at Higher Technological Institute (HTI), Tenth of Ramadan City from september 2015 to July 2023.
5- Teaching Assistant, Department of Mechanical Engineering at the Arab Academy for Science Technology and Maritime Transport (AAST) from september 2014 to september 2015.
6- Production engineering & Quality in EL- FATEH for Industrial Engineering from september 2013 to september 2015.
7- Technical manager in Z-motors for engines manufacturing from 2017 to 2018.

Achievements and Honour

1- Ranked 1st in EVER(Electric Vehicle Rally) competition for electric car,2019.
2- Ranked 1st out of Undergraduate in Higher Technological Institute (HTI),2013.

Training Courses and Activities:

1- Attend a training course entitled "The general session on the intellectual property of Egypt" from **10 February 2020 to 11 April 2020.**
2- Attend a training course entitled "Promoting your research capabilities - The modern knowledge Cycle" within **august 2019.**
3- Member at national youth council,responsible for developing minstry of industry and trading **(2019 to present)**.
4- Attend a training course entitled "Education Programs and Courses Specifications and Evaluation of Learning Outcomes for High Education Faculties and Institute" during the period **07 to 09 august 2018**.
5- Attend a training course entitled" Effective Teaching and Learning Strategies for Colleges and Institutes of Higher Education" during the period **07 to 08 november 2018**.
6- Member at Egyptian association for metal casting.

Computer Skills:

- ABAQUS finite element modelling tool
- SOLIDWORKS computer aided design tool
- Microsoft Office (Microsoft PowerPoint, Word, Excel and Project)

Date of Birth: 08/08/1990

Acted as a reviewer for the following journals:

- International Journal of Materials Science and Applications
- Materials Science Forum (MSF)
- Key Engineering Materials (KEM)
- Applied Mechanics and Materials (AMM)
- Materials today: proceedings.
- SAE International

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

Research Gate: https://www.researchgate.net/profile/Mahmoud-Essam?ev=hdr_xprf&_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6ImhvbWUiLCJwYWdlIjoiaG9tZSIsInBvc2l0aW9uIjoiZ2xvYmFsSGVhZGVyIn19

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Scopus ID: https://www.scopus.com/authid/detail.uri?authorId=57204471886

References available upon request