Mostafa Shawky Abdelmoez

Ph.D. in Mechanical Power Engineering | Assistant Professor, Cairo University

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PROFESSIONAL PROFILE

Dynamic and detail-oriented Mechanical Assistant Professor with extensive experience in advanced design and optimization of energy systems, HVAC engineering, and renewable energy projects. Expertise spans refrigeration systems (RAC/MAC), data center thermal management, medical and industrial (MDI) HVAC applications, compressor design, energy management, and sustainability planning. Experienced in low-GWP refrigerant evaluation and next-generation refrigerant system design. Proven track record in leading technical assessments, conducting energy audits, delivering LEED-certified energy models for data centers and commercial buildings, and implementing efficient HVAC systems across hospital, data center, and industrial sectors.

EDUCATION

Ph.D. in Mechanical Power Engineering | Cairo University | *Giza, Egypt*
2018 – 2022

- Thesis: "Design of a Novel Turbo-Vapor Axial Compressor"
- Compressor and turbine 1D/2D/3D design using different loss models, ANSYS CFX, and full mechanical design (bearings, shaft, clutch, coupling, starting motor, sealing).

M.Sc. in Mechanical Power Engineering | Cairo University | *Giza, Egypt*
2012 – 2015

- Thesis: "Numerical Investigation for Smoke Spread in an Underground Car Garage"
- Smoke management system design using Fire Dynamics Simulator (FDS) per NFPA & BS codes.

B.Sc. in Mechanical Power Engineering — Very Good with Honors (GPA 3.6, Ranked 7th) | Cairo University | *Giza, Egypt*
2007 – 2012

ACADEMIC APPOINTMENTS

Assistant Professor | Cairo University, Faculty of Engineering | *Giza, Egypt*
2022 – Present

Adjunct Professor | Akhbar El Youm Academy, Faculty of Engineering | *Cairo, Egypt*
2024 – Present

Assistant Lecturer | Cairo University, Faculty of Engineering | *Giza, Egypt*
2016 – 2021

Demonstrator | Cairo University, Faculty of Engineering | *Giza, Egypt*
2012 – 2016

PROFESSIONAL EXPERIENCE

Technical Advisor | Integral Rise | *Cairo, Egypt*
2024 – Present

- LEED consulting, energy modeling for commercial buildings and data centers, feasibility studies for PV systems, energy audits, RECP interventions, compressed air system optimization, and low-GWP refrigerant feasibility assessments.
- Key projects: energy efficiency measures for 18 Egyptian universities, SODIC building energy modeling (NOVA, XV, YVE), AWBE HQ and MOBILIY data centers energy modeling, NOOR City Data Center LEED Platinum sustainability concept design.

HVAC Engineer | SHARAF CONSULTANT | *Cairo, Egypt*
2019 – 2023

- Design of HVAC systems for hospitals and medical facilities (VRV, chilled water, RAC/MAC systems), refrigerant selection and system sizing, load calculations, BOQ preparation, shop drawing approval. Applied knowledge of low-GWP refrigerant alternatives in system design.
- Projects: Al-Galala Hospital, Al-Galala University, Old Kasr el Eniy, Assuit Hospital, Minya Hospital.

Mechanical Designer | INSHA Factory for Conveyor Belts | *Giza, Egypt*
2015 – 2016

Mechanical Engineer | Saleh & Hegab | *Giza, Egypt*
2015 – 2016

Junior Quality Engineer / Lab Engineer | MCL | *Giza, Egypt*
2014 – 2015

- Measurement and calibration of temperature, pressure, noise, lux, coating thickness, dust & environmental parameters.

SELECTED CONSULTANCY PROJECTS

Energy Efficiency in Egyptian Universities (18 Universities, 2024–Present)

Led solar PV feasibility studies, AC efficiency upgrades, and LED retrofit projects.

SODIC Energy Modelling – Buildings NOVA, XV, YVE (2024)

Energy modeling using DesignBuilder (EnergyPlus v9.4) achieving LEED certification (4–10 points) with 25–42.8% energy savings.

AWBE Headquarters & Data Center Energy Modeling (2024)

30.6% energy reduction (3,551,463 kWh) vs. ASHRAE 90.1-2010 baseline, securing 6 LEED points.

MOBILIY Data Centers – Jeddah & Riyadh (2024)

Tier III data center energy modeling (freelance) achieving 10.4% energy efficiency improvement, earning 2 LEED credit points. Simulation included evaluation of low-GWP refrigerant alternatives for cooling system optimization in hot-climate data center environments (Jeddah & Riyadh).

NOOR City Data Center – Sustainability Concept Design & LEED Platinum Consulting (2023)

Led sustainability concept design and LEED v4 BD+C Platinum certification strategy for the Noor City Data Center (Talaat Moustafa Group), a 3,520 m² two-floor facility within a smart eco-city development. Conducted full DesignBuilder (EnergyPlus v9.4) energy modeling achieving 21.9% energy savings vs. ASHRAE 90.1-2010 baseline. Analyzed six energy conservation measures (ECMs): LED lighting, daylight controls, high-performance glazing (U-1.26, SHGC 0.27), enhanced wall/roof insulation, high-efficiency DX VAV AHUs with heat recovery, and a 21.9%-efficiency PV system. HVAC proposed design used VRF + DOAS. Performed daylight simulation (73.3% sDA, avg 1,015 lux) and quality views assessment. Targeted 69+ LEED points including 9 pts in Energy & Atmosphere, 11 pts in Location & Transportation, and full Water Efficiency prerequisites. Prepared LEED scorecard, responsibility matrix, and commissioning plan documentation.

Mall of Egypt (MOEG) Energy Modeling (2024)

33.9% energy savings vs. ASHRAE 90.1-2010 baseline.

Compressed Air System Optimization – Midani Man-Made Fibers Factory (2024)

Leakage reduction, inappropriate air use elimination, compressor downsizing, pressure optimization, high-efficiency motor retrofit, air quality enhancement.

Data Center HVAC CFD Simulation(2024)

Performed detailed CFD simulations using ANSYS Fluent to analyze airflow distribution, temperature gradients, and hotspot formation in data center environments. Evaluated cooling strategies including CRAH/CRAC configurations, containment systems (hot aisle/cold aisle), and airflow optimization techniques to enhance thermal performance and energy efficiency in compliance with ASHRAE TC 9.9 guidelines.

Mall in KSA – HVAC Design(2024)

Developed complete HVAC design for a commercial mall in Saudi Arabia, including cooling load calculations, system selection (chilled water / VRF), duct sizing, and equipment layout. Applied ASHRAE standards for ventilation, indoor air quality, and energy efficiency. Coordinated system integration considering high occupancy variability and extreme climate conditions.

CFD Analysis of Aquarium Glass Structure(2023)

Conducted CFD and thermal-fluid analysis to study fluid flow behavior and heat transfer around large aquarium glass panels. Assessed structural and thermal stresses due to water pressure, temperature variation, and flow circulation systems. Provided design recommendations to ensure structural integrity, minimize thermal gradients, and enhance long-term operational safety.

TEACHING EXPERIENCE

- Fluid Mechanics
- Engineering Thermodynamics
- Heat Transfer
- Internal Combustion Engines
- Turbomachines
- Refrigeration & Air Conditioning
- Power Plants
- Pipeline Engineering
- Quality Engineering
- Numerical Methods
- Control Systems

COMPUTER SKILLS

- ANSYS Fluent (CFD)
- ANSYS CFX
- Static Structure / Modal Analysis
- Fire Dynamics Simulator (FDS)
- MATLAB
- R-Studio
- DesignBuilder
- HAP
- Homer
- SolidWorks
- MS Office
- Photoshop / Elite

PATENTS

Egypt/Cairo Patent 2020/798 (Under Review) — A Novel Turbo-Vapor Axial Compressor (2020) *Co-inventors: A. Mobarak, S. Ali, M. Shawky*

PUBLICATIONS — JOURNAL ARTICLES

2026 Sustainable Thermal Management in Building HVAC. *International Journal of Heat and Technology, 44(1).* DOI: 10.18280/ijht.440125

2026 Ventilation, Thermal Comfort, and Energy Strategies for Underground Shelters. *International Journal of Heat and Technology, 44(1).* DOI: 10.18280/ijht.440107

2025 Literature Review on Wind Turbines: Design, Performance, and Technological Developments. *International Journal of Industrial and Manufacturing Systems Engineering, 10(3).* DOI: 10.11648/j.ijimse.20251003.12

2025 Literature Review: Hybrid Wind-Solar Energy Systems for Domestic Applications. *Journal of Tianjin University Science and Technology.* DOI: 10.5281/zenodo.17433218

2025 Advanced Thermal Modeling and Heat Recovery Systems for Enhancing Building Energy Sustainability. *Journal of Tianjin University Science and Technology.* DOI: 10.5281/zenodo.17164377

2025 Advancements in Wind Turbine Technology: A Comprehensive Study of Design, Deployment, and Energy Storage. *International Journal of Science, Engineering and Technology.* DOI: 10.5281/zenodo.15827519

2025 Design of Horizontal Axis Wind Turbine (HAWT). *International Journal of Science, Engineering and Technology.*

2025 Studying, Simulation and Analysis of a Small-Scale HAWT Using MATLAB and Ansys. *International Journal of Science, Engineering and Technology.*

2025 Thermal Management of On-Board Chargers: A Review of Literature. *International Journal of Heat and Technology, 43(6).* DOI: 10.18280/IJHT.430615

2023 Mechanical Design of a Novel Low-Pressure Turbo Vapor Compressor. *International Journal of Advance Scientific Research and Engineering Trends, 9(5).*

2021 Quasi Three-Dimensional Design for a Novel Turbo-Vapor Compressor and the Last Stage of a Low-Pressure Steam Turbine. *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences, 85(2).* DOI: 10.37934/arfmts.85.2.113

PUBLICATIONS — CONFERENCE PAPERS

2021 Quasi Three-Dimensional Design for a Novel Turbo-Vapor Compressor. *14th International Conference of Fluid Dynamics (ICFD14), Cairo, Egypt.*

PUBLICATIONS — UNDER REVIEW / SUBMITTED/Accepted

2026 Design and Optimization of an Axial Turbo-Vapor Compressor Through Three- Dimensional Flow Analysis and Loss Modeling. *Journal of Thermal Engineering(Accepted).*

2026 HYBRID WIND-SOLAR SYSTEMS: A Comprehensive Simulation, Optimization, and Decision Support Framework for Arid Climates with a Case Study in Kuwait. *International Journal of Energy Production and Management (Accepted).*

2026 Water Desalination for Underground Shelters: A Comprehensive Literature Review. *Journal of Sustainability for Energy (Accepted).*

2026 Numerical Investigation of Smoke Spread and Thermal Performance in Underground Car Parks with Operating Vehicles. *International Journal of Energy and Power Engineering(Accepted).*

2026 Enhancing Thermal Mixing Efficiency in Electric Water Heaters through Inverted Cup Designs: A Comprehensive CFD Analysis with Experimental Validation. *Journal of Engineering and Applied Science (Under Review).*

2026 Advanced Photovoltaic-Thermal (PV-T) Hybrid System Optimization for Enhanced Energy and Exergy Performance in Arid Climates: A Comprehensive Numerical Investigation and Experimental Validation. *Journal of Engineering and Applied Science (Under Review).*

2026 Two-Dimensional Design for a Novel Turbo-Vapor Compressor. *Journal of Engineering and Applied Science (Under Review).*

PROFESSIONAL DEVELOPMENT & TRAINING — CAIRO UNIVERSITY FLDC

2024 Applications of Artificial Intelligence in Education and Scientific Research — *Trainer: Dr. Hamed Khairallah* (Cairo University FLDC)

2024 Fundamentals of Digital Transformation (Cairo University FLDC)

2021 Critical Thinking — *Trainer: Dr. Essam Gameel* (Online · 28–29 July 2021)

2021 Decision-Making and Problem-Solving — *Trainer: Dr. Hany El-Hayat* (Online · 6–7 October 2021)

2021 Blended Learning Basics — *Trainer: Dr. Rasha Mohamed* (Online · 21–23 January 2021)

2020 Ethics and Academic Integrity in University Work — *Trainer: Dr. Mohamed Kamal El-Gezrawy* (Online · 9–10 September 2020)

2020 Scientific Conference Organization — *Trainer: Dr. Mohamed Al-Muslimi* (Online · 17–18 August 2020)

2015 Quality Standards in the Teaching Process — *Trainer: Dr. Amr Mostafa* (6–7 September 2015)

2015 Exams and Student Evaluation Systems — *Trainer: Dr. Abu Al-Fadl Obeid* (6–7 June 2015)

2015 Effective Teaching Skills — *Trainer: Dr. Hamed Khairallah & Dr. Hany Beshir* (6–7 January 2015)

2014 International Publishing in Scientific Journals — *Trainer: Dr. Maha Hassan & Dr. Samar* (6–7 September 2014)

2014 Modern Trends in University Teaching — *Trainer: Dr. Younes El-Dahaby & Dr. Asmaa Fakhry* (16–18 August 2014)

2014 Accredited Hours System — *Trainer: Dr. Rizk Mohamed & Dr. Moafy Hamed* (17–18 March 2014)

ADDITIONAL INFORMATION

Formula Student (2012): Designed full cooling system for a high-performance ICE used in a formula racing car, competing at Silverstone Racing Circuit, UK.

Nationality: Egyptian **| Military Status:** Completed (01/03/2014) **| Date of Birth:** 17 November 1989

References available upon request.