

# **Ahmed Mohamed Nagib Elmekawy, Ph.D., P. E.**

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## **PROFESSIONAL EXPERIENCE**

### **Alexandria University, Mechanical Engineering, Alexandria, Egypt (2015 - Present).**

#### **Assistant Professor**

Conduct research in Fluid-Structure Interaction using CFD and Structural Dynamics, Heat Transfer and Optimization. Teach courses such as Computational Fluid Dynamics, Mechanical Vibration, Finite Element Analysis, Automatic Control, Machine Design, Matlab, Mechanics of Material and Optimum Design.

- Published 2 conference and 3 journal papers.
- Perform consulting jobs.
- Leading several student competition teams such as:
  - Two robotics teams who build remotely underwater operated vehicles and participated in regional and international competitions. Teams were ranked 1<sup>st</sup> and 3<sup>rd</sup> of 28 teams at International ROV Competition at Seattle, USA, June 2018.
  - A robotic team participated in international competition at India, 2015. Team was ranked 4<sup>st</sup> of 32 teams.
  - A human powered vehicle team participated in ASME HPVC competition, team was ranked 13<sup>th</sup> of 48 teams international competition at Michigan, USA, April 2019.
  - Supervision of remote controlled aircraft team participated in SAE international competition at Florida, USA, March 2018.
- ASME Student Chapter Supervisor at Alexandria University (2016- 2019).
- Department representative for Faculty quality assurance.
- Designed and built a website to upload lectures to the students with more than 700,000 views in three years.

### **Flexible Steel Lacing Company (Flexco), Grand Rapids, MI, USA (June – September 2019) & (2012 – 2015).**

#### **Staff Research and Development Mechanical Engineer**

Developed and implemented continuous and discrete physical models using state-of-art and advanced FEA algorithms. Conducted motion and kinematic analysis and linkage optimization for applicator tools. Participated in the design, performance and evaluation of appropriate experiments to solve engineering problems, and to validate simulations by using a variety of sensors. Designed and selected of applicator tools, hydraulic and Pneumatic equipment and heat exchangers.

- Jumpstarted several finite element analysis projects by leading approaches and methodologies that were not previously considered reducing new products release time by 50% incorporating mathematical modeling and optimization.
- Mathematical analysis and optimization of one manual and two hydraulic applicator tools leading to a successful product launch of 1million program and publishing 1 patent.
- Lead the analysis and data acquisition team resulting in expediting the lunch of three projects.

### **Dr Ahmed Nagib Consulting Office, Alexandria, Egypt (2015 -Present).**

#### **Manager**

Conduct consultation jobs in the following areas: Hydraulic Pipeline Design - Firefighting - HVAC - Vibration Analysis and Fault Diagnosis - Piping Stress Analysis - Finite Element Analysis - Boilers - Dryer - Elevator - Steel Production Factory - Enhancing the productivity of Production line - Flour Mill Design.

**Zewail City for Science and Technology, Space and Communications Engineering, 6th of October City, Egypt (2016 -2019).**

**Adjunct Professor**

Conduct research in Helicopter Blade Optimization and CFD coding. Teach courses such as Aerodynamics, Supersonic and Hypersonic Fluid Dynamics, Fluid Mechanics and CFD.

- Design and Build of subsonic wind tunnel.
- Published one conference paper.

**Weiler Engineering, Elgin, IL, USA (June – September 2016).**

**Senior Analysis Engineer**

Plastic flow Simulation inside molds by using Ansys Polyflow.

- Solved parison flow issue facing the company for 30 years leading to \$10m in sales opportunity
- Improved flow distribution in head by 50% leading to lower inlet pressure and better adjusting of the outlet flow.

**EDUCATION**

**Ph.D. in Aerospace Engineering.**

**Old Dominion University**, Norfolk, VA, USA, May 2014. GPA: 3.74 /4.0

Ph.D. Dissertation: Fluid-Structure Interaction Modeling of a F/A-18 Twin-Tail Buffet Using Non-Linear Eddy Viscosity Models.

**Master of Science in Mechanical Engineering.**

Alexandria University, Alexandria, Egypt, August 2009. GPA: 3.72 /4.0

Master Thesis: Effect of Magnetic Bearings on Rotor Dynamics.

**Bachelor of Science in Mechanical Engineering.**

Alexandria University, Alexandria, Egypt, June 2006. GPA: 3.8/4.0

B.Sc Project: Design and Manufacturing of a Desalination and Air conditioning unit.

**TEACHING EXPERIENCE**

Aerodynamics • Fluid Mechanics • Supersonic and Hypersonic Fluid Dynamics • Computational Fluid Dynamics • Mechanical Vibration • Machine Design • Computer Applications in Mechanical Engineering • Finite Element Analysis • Machine Drawing • Theory of Machines • Mechanics of Material • Optimum Design • Automatic Control.

**POST GRADUATE TEACHING EXPERIENCE**

Computational Fluid Dynamics • Finite Element Analysis

**RESEARCH INTERESTS**

Fluid-Structure Interaction • Computational Fluid Dynamics • Polymer Flow Simulations • Flow induced vibration • Two Phase Flow • Turbulence Modeling • Structural Analysis • Energy Harvesting • Optimization.

**COMPUTER SKILLS**

ANSYS Fluent • ANSYS CFX • ANSYS Polyflow • ANSYS Mechanical • ABAQUS • Nastran/Patran • SAP • Matlab • Visual Basic.Net • Fortran • C programming language • 3D Max • Primavera • SolidWorks • AutoCAD • LabView • Microsoft Office.

**CERTIFICATION & MEMBERSHIP**

Professional Engineer License from Wisconsin, USA (October 2014)  
Certified Category II - Vibration Analyst from Vibration Institute, USA (2013)  
AIAA, ASME member.

## PATENTS & PUBLICATIONS

1. Hydraulic vibratory tool for driving rivets of conveyor belt fasteners, S. Ng, D. Lotarski, A. Elmekawy – US Patent 2015/023073 - October 2015.
2. F/A-18 Twin-Tail Buffet Modeling Using Non-Linear Eddy Viscosity Models, Ahmed Elmekawy, Osama Kandil and Oktay Baysal, Journal of Aircraft, Vol. 53, No. 4 (2016), pp. 1106-1112.
3. F/A-18 Twin-Tail Buffet Modeling Using Non-Linear Eddy Viscosity Models, Ahmed Elmekawy, Osama Kandil and Oktay Baysal, 44<sup>th</sup> AIAA Fluid Dynamics Conference, Georgia, USA, June 2014.
4. Numerical analysis of the prediction of the two-phase flow pattern by measuring vibration of pipelines, **Ahmed Elmekawy**, Mohamed Shabara, Hassan Elgamal and Bassuny El-Souhily, **ASME IMECE** Conference, Florida, USA, November 2017.
5. Aerodynamic Shape Optimization of Helicopter Rotor Blades in Hover using Genetic Algorithm and Adjoint Method, Sameh Darwish, Mohamed Abdelrahman, **Ahmed Elmekawy**, Khairy Elsayed, 56th AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, Florida, USA, January 2018.
6. Numerical study of improving Savonius turbine power coefficient by various blade shapes, Ahmed Elmekawy, Hassan Saeed, Sadek Kassab, Alexandria Engineering Journal, Vol. 58, Is. 2, June 2019. *Hassan A.Hassan Saeed, **Ahmed M.Nagib Elmekawy**, Sadek Z.Kassab* Order of authors is incorrect
7. Optimization methodology to target a vibration source natural frequency of energy harvesting cantilever, Sallam Kouritem, Khaled Mohamed, **Ahmed, Elmekawy**, Hassan ELgamal, 9<sup>th</sup> Intl. Conf. on Advances in Civil, Structural and Mechanical Engineering, ACSM, London, United Kingdom, July 2019.
8. Computational modelling of non-equilibrium condensing steam flows in low-pressure steam turbines, **Ahmed Elmekawy**, Mohey Ali, Results in Engineering Journal, Dec. 2019, Volume 5, March 2020, 100065, DOI: 10.1016/j.rineng.2019.100065.
9. Simulations of Flow Separation Control using Different Plasma Actuator models, Hatem Abdelrauf, **Ahmed M. Nagib Elmekawy**, Sadek Kassab, Alexandria Engineering Journal, In Press, June 2020.
10. Two-Dimensional CFD study on the enhancement of tube bank configuration heat exchanger, **Ahmed Elmekawy**, Abdelrahman Shahin, Ain Shams Engineering Journal, , In Press June 2020.

## RESEARCH PROPOSAL

- One of the PIs of the consortium of Electric Car project (ASRT Call no. 2/2019) with a budget of 10 million EGP – ongoing.
- Design, Manufacture and Test a ventilator for Corona virus patients in Egypt (ASRT Call no. 7283) with a budget of 130,000 EGP – ongoing.
- Assessment, optimization, and control of Oscillating Water Column submitted to NSF in collaboration with Iowa State University. (Under Review).
- Design of Dielectric Barrier Discharge Plasma Actuation for Active Flow Control, submitted to STDF, Egypt. (Passed initial screening and in final review process).

## TRAINING COURSE INSTRUCTOR EXPERIENCE

- **Robotics For Kids** (Feb. 2019)  
Engineering Center, Faculty of Engineering, Alexandria University, Alexandria, Egypt.
- **Introduction to Vibration Analysis** (Jan., Oct., Dec. 2016)  
Abuqir Fertilizers, Alexandria, Egypt.
- **SolidWorks Essentials** (over 10 sessions from 2016 to 2018)  
Engineering Center, Faculty of Engineering, Alexandria University, Alexandria, Egypt.
- **Vibration Analysis – Cat I** (Dec. 2016)  
Engineering Center, Faculty of Engineering, Alexandria University, Alexandria, Egypt.
- **Vibration Analysis – Cat II** (Jan. 2017)  
Engineering Center, Faculty of Engineering, Alexandria University, Alexandria, Egypt.

- **Fits, tolerances and Measurement** (May 2016)  
Ezz Eldekhila Steel Plant, Alexandria, Egypt.
- **Drawing Interpretation** (Feb. 2017, May 2016, Sep., Nov. 2017)  
Ezz Eldekhila Steel Plant, Alexandria, Egypt.

## CONSULTATION EXPERIENCE

### **Hydraulic Pipeline Design**

#### **Design of Natural Gas Network for a Residential Area.**

Palm Hills, 6<sup>th</sup> of October, Egypt, Aug. 2017.

Pipeline sizing, material selection, pressure reduction station selection for a new residential area of 1000 hectare and 100,000 population.

#### **Hydraulic calculation and Storage Tank heating system.**

Total, Borg Elarab, Alexandria, Egypt, July 2017.

Pipeline sizing, Heat Exchanger and Pump Selection.

### **Boilers**

#### **Evaluation and selection of fire tube boiler.**

Alexandria University Dorms, Alexandria, Egypt, Dec. 2018.

### **Dryer**

#### **Evaluation and maintenance procedure of a dryer.**

Elgharbia Sanitary Station, Alexandria, Egypt, Feb. 2018.

### **Firefighting and HVAC System Design**

#### **HVAC System Design and Supervision.**

Alexandria Library, Elshatby, Alexandria, Egypt, Feb. 2019.

Design and Supervision of HVAC and Ventilation Systems.

#### **HVAC System Design and Supervision.**

Methanex, Dimiatta, Egypt, April 2020.

Design and Supervision of HVAC, Ventilation and Fire Fighting Systems.

#### **Ventilation System Design and Supervision.**

Methanex, Dimiatta, Egypt, April 2020.

Design and Supervision of Ventilation System for the Compressor House.

#### **HVAC System Design and Supervision.**

Elmiry Hospital, Elshatby, Alexandria, Egypt, Feb. 2019.

Design of HVAC and Ventilation System for Sterilization room.

#### **Firefighting System Evaluation and Design.**

Faculty of Engineering, Alexandria, Egypt, Oct. 2018.

Evaluation and designing of Firefighting system.

#### **Firefighting System Evaluation.**

Traffic Administration buildings, Alexandria, Egypt, Oct. 2018.

Evaluation and designing of Firefighting system.

#### **Firefighting System design.**

Alashraf Wood Storage, Alexandria, Egypt, March 2018.

Design of a sprinkler firefighting system and pumping station selection.

#### **Firefighting and HVAC Systems Design and Supervision.**

Elmowasah Educational Building, Elshatby, Alexandria, Egypt, April 2018.

Design and Supervision of a sprinkler, FM 200 firefighting system and pumping station selection.

Design and Supervision of HVAC and Ventilation Systems

#### **Firefighting System upgrade.**

Elmiry Hospital and Anatomy Building, Elshatby, Alexandria, Egypt, Dec 2017.

Design of a sprinkler firefighting system and pumping station selection. Design HVAC system.

**Firefighting System upgrade.**

Elhadara Hospital (Nariman), Elhadara, Alexandria, Egypt, July 2017.  
Design of a sprinkler firefighting system and pumping station selection.

**Firefighting System design.**

Alashraf Wood Storage, Alexandria, Egypt, March 2018.  
Design of a sprinkler firefighting system and pumping station selection.

**Firefighting System design.**

Abnaa Elaamah Wood Storage, Alexandria, Egypt, March 2018.  
Design of a sprinkler firefighting system and pumping station selection.

**Firefighting System design.**

Damnhour Cancer Center, Damnhour, Egypt, March 2018.  
Design of a sprinkler firefighting system and pumping station selection.

**Assessment and Renovation of HVAC, Firefighting system.**

Ras Eltin General Hospital, Ras Eltin, Alexandria, Egypt, Nov. 2016.  
Evaluation and designing Firefighting, Plumbing, HVAC and Medical Gases Network.

**Restaurant HVAC system.**

Alshawrmgy, San Stefano Mall, Alexandria, Egypt, August. 2017.  
Designing Firefighting HVAC Systems.

**Finite Element Analysis****Failure Analysis Report of Pile Rig Pin of Impact Hammer.**

Bechtel, Rosetta, Egypt, Nov. 2016.  
Finite Element and Fracture Analysis.

**Monitoring of the Deflection of a Concrete Beams.**

Exon Mobile, Wadi Elkamar, Alexandria, Egypt, Aug. 2018.  
Installing dial gauges to monitor the deflection of the beams.

**Vibration Analysis and Fault Diagnosis****Vibration Measurement and Analysis for a Mud Separator.**

Savola Foods, Alexandria, Egypt, Jan. 2019.  
Measure the current vibration levels, indicate whether the vibration level is accepted or not and balance the machine.

**Vibration Measurement and Analysis for a Mixer.**

Unilever, 6<sup>th</sup> of October, Egypt, Nov. 2018.  
Measure the current vibration levels, indicate whether the vibration level is accepted or not and find a solution to reduce the vibration.

**Vibration Measurement and Fault diagnosis for main factory fan.**

Alkan Textile Company, Almatex Group, Free Zone, Alexandria, Egypt, March 2018.  
Measure the current vibration levels, indicate source of unbalance and reducing vibration to accepted levels.

**Vibration Measurement and Analysis for Sieve.**

Unilever, 6<sup>th</sup> of October, Egypt, April. 2017.  
Measure the current vibration levels, indicate whether the vibration level is accepted or not and find a solution to reduce the vibration transmitted to the supporting steel structure.

**Vibration Analysis of Sanitary Vertical Pumps.**

Elgharbia pumping Station, Alexandria, Egypt, Feb. 2016.  
Identifying the source of high level vibration of pumps leading to reducing the vibration level and increasing the availability by 50%

**Vibration Analysis of Sanitary Vertical Pumps.**

Elseuf pumping Station, Alexandria, Egypt, Feb. 2016.  
Reviewing the vibration level of a new pump leading to find a problem with the foundation.

### **Vibration Study of the Two Phase Flow in the Vertical Distributer.**

ELAB Petroleum Company, Alexandria, Egypt, Nov. 2015.

Reviewing the support design and the vibration level of a two phase flow pipe line leading to successful installation.

### **Piping Stress Analysis**

#### **Piping Stress Analysis Report For pump room.**

Riyadah City, Saudi Arabia, Nov. 2018.

Check and modifying pipeline supports to withstand loads.

#### **Piping Stress Analysis Report For Fire Fighting Line.**

Alexandria, Egypt, June 2020.

Design the pipeline supports to withstand loads.

### **Elevator**

#### **Alahly Hospital.**

Fleming, Alexandria, Egypt, July 2018.

Revision on the status of the elevators, writing specification of a new elevator, supervise construction and accept the installed elevator.

#### **Moustafa Kamel Tower.**

Moustafa kamel, Alexandria, Egypt, November 2018.

Revision on the status of the elevator writing specification of a new elevator, supervise construction and accept the installed elevator.

#### **Petroleum Hospital.**

Fleming, Alexandria, Egypt, July 2018.

Revision on the status of the elevators, writing specification of a new elevator, supervise construction and accept the installed elevator.

#### **Stanley Tower.**

Stanley, Alexandria, Egypt, May 2018.

Revision on the status of the elevator.

#### **Egyptian Customs Authority.**

Elgomrok, Alexandria, Egypt, April 2018.

Revision on the status of the elevator.

#### **Tax Authority.**

Safia Zaghloul, Alexandria, Egypt, Mar. 2018.

Revision on the status of the elevator.

#### **Damnhour General Hospital.**

Elshatby, Alexandria, Egypt, Dec. 2017.

Revision on the status of the elevator and writing specification for the new elevator.

### **Steel Production Factory**

#### **Elaashry Steel Production.**

6<sup>th</sup> of October city, Egypt, Sep. 2017.

Hydraulic calculation for existing pipeline of quenching system and pump to solve motor overload shutdown.

#### **Sarhan Steel Production.**

Borg Elarab, Alexandria, Egypt, Nov. 2017.

Hydraulic calculation for existing pipeline of quenching system and pump to solve motor overload shutdown.

### **Enhancing the productivity of Soap Production line**

#### **Reliability analysis Soap Production line.**

Unilever, 6<sup>th</sup> of October, Egypt, July 2017.

Increasing reliability of line by identifying sources of production loss and solve it to reduce stoppage time of the line.

### **Flour Mill Design**

#### **Design and Construction Supervision of a Flour Mill.**

Elsafir Mill, Kafr Elsheikh, Egypt, April 2017.

Machine Layout and piping design for the mill, Fire Fighting , Plumbing and Ventilation system design . Construction Supervision and Startup of the mill.

<h3><b>ACTIVITIES AND HONORS</b></h3>
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**Ranked 4<sup>th</sup> of 535 students in Mechanical Engineering Department (2006)**

Alexandria University, Alexandria, Egypt

**Mantrac Best Graduation Project Award (2006)**

Mantrac, Alex-Cairo Desert Road, Alexandria, Egypt

**Master Assistantship (2006- 2009)**

Alexandria University, Alexandria, Egypt

**PhD Assistantship & Fellowship (2009- 2012)**

Old Dominion University, Norfolk, VA, USA

**President of the Egyptian Student Association (2011-2012)**

Old Dominion University, Norfolk, VA, USA.