Medhat Khalil, Ph.D., CFPAI, CFPHS.

Program Director of Fluid Power Education
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Objective: Apply my academic background and industrial experience towards academic teaching, research work, professional education and industrial innovative developments.

Industries Experienced in: Fluid Power, System Dynamics & Control, Modeling & Simulation, Mechatronics, Energy Transmission.

Biography:

Dr. Medhat Khalil, for over 20 years, is working as the Program Manager for fluid Power Education at the Applied Technology Center, Milwaukee School of Engineering, Milwaukee, WI, USA. Medhat has bachelor's degree and in mechanical engineering from Military Technical College (MTC), Cairo, Egypt. He got his master's degree in mechanical engineering from Cairo University, Cairo, Egypt. Medhat has PHD's degree in Mechanical Engineering and Post-Doctoral Industrial Research Fellowship from Concordia University in Montreal, Quebec, Canada. Medhat authored several textbooks in the field of fluid power. He participated in many technical conferences and published several reviewed technical papers. Medhat has been certified by the International Fluid Power Society (IFPS) as: Certified Fluid Power Hydraulic Specialist (CFPHS) and Certified Fluid Power Accredited Instructor (CFPAI).

Medhat is a member of many grand institutions such as Center for Compact and Efficient Fluid Power Engineering Research Center (CCEFP), listed Fluid Power Consultant by the National Fluid Power Association (NFPA), and listed professional instructor by the American Society of Mechanical Engineers (ASME), and National American Die Casting Association (NADCA). Medhat has been assigned as the chair of the education committee for the International Fluid Power Exposition since 2017. Medhat has a balanced academic and industrial experience. He developed and taught countless courses for industry professionals worldwide (USA, Canada, India, Mexico, KSA, UAE). Medhat had worked for several world-wide recognized industrial organizations such as Rexroth in Germany and CAE in Canada. Medhat has designed several hydraulic systems and developed analytical and educational software. Medhat also has vast experience in modeling and simulation of dynamic systems using Matlab-Simulink. Medhat was the designer and founder of the Universal Fluid Power Trainers. Medhat was the recipient of the "Otto Maha Pioneers in Fluid Power" award in 2012 and the "IFPS-Hall of Fame" award in 2021.

Academic Education:

Mar 2003 – June 05	**Post Doctorate Industrial Research Fellowship.** Power Systems Control and Simulation Department, CAE Inc., Montreal, Quebec, Canada.
March 2003	**Ph.D. (Doctor of Philosophy) in Mechanical Engineering.** College of Engineering, Concordia University, Montreal, Canada. **Thesis Title:** Performance Investigation of Swash Plate Axial Piston Pumps with Conical Cylinder Block.
March 1989	**Master of Mechanical Engineering.** College of Engineering, Cairo University, Cairo, Egypt. **Thesis Title:** Theoretical and Experimental Investigation of Performance of Four Nozzle Hydraulic Servo-Valve.
June 1983	**Bachelor of Engineering.** Military Technical College, Cairo, Egypt. **Major:** Mechanical Engineering. **Minor:** Automotive Engineering.

Books:

- Hydraulic Systems Volume 1: Introduction to Hydraulics for Industry Professionals.
- ISBN: 978-0692-62236-0. Published by 2016 by CompuDraulic LLC.

- Hydraulic Systems Volume 2: Electro-Hydraulic Components and Systems.
- ISBN: 978-0-9977634-2-3. Published by 2017 by CompuDraulic LLC.

- Hydraulic Systems Volume 3: Hydraulic Fluids and Contamination Control.
- ISBN: 978-0-9977816-3-2. Published by 2019 by CompuDraulic LLC.

- Hydraulic Systems Volume 4: Hydraulic Fluids Conditioning
- ISBN: 978-0-9977634-8-5. Published by 2022 by CompuDraulic LLC.

- Hydraulic Systems Volume 5: Safety and Maintenance.
- ISBN: 978-0-9977816-5-6. Published by 2022 by CompuDraulic LLC.

- Hydraulic Systems Volume 6: Troubleshooting and Failure Analysis.
- ISBN: 978-0-9977634-6-1. Published by 2022 by CompuDraulic LLC.

- Hydraulic Systems Volume 7: Modeling and Simulations for Application Engineers.
- ISBN: 978-0-9977634-3-0. Issued in 2020 by CompuDraulic LLC.

- Hydraulic Systems Volume 8: Advanced Designs for Mobile Applications
- ISBN: 979-8-9870268-1-6 Issued in 2025 by CompuDraulic LLC.

- Hydraulic Components Volume A: Hydraulic Sealing Elements.
- ISBN: 978-0-9977634-9-2. Published by 2018 by CompuDraulic LLC.

- Hydraulic Components Volume B: Hydraulic Filters.
- ISBN: 978-0-9977634-0-9. Published by 2023 by CompuDraulic LLC.

- Hydraulic Components Volume C: Hydraulic Transmission Lines.
- ISBN: 979-8-9870268-0-9. Published by 2023 by CompuDraulic LLC.

Patent:

- Double Swash Plate Pump with Valve Ring Concept "Pending Patent #US 20140308139 A1"

Litigation History:

- Engaged as an expert witness for defendants in a trade secret action concerning a misappropriated actuator design. in the United States District Court for the Northern District of Illinois. Prepared and issued expert report.
- Engaged as an expert witness for a plaintiff in a case that involve a death of a sweeper driver due to machine design errors. The case was settled on the side of the plaintiff based on a technical report analyzing the machine system design and the condition of the accident.

Laboratories Development:

Contributed to specifying and commissioning of many research and training labs for different educational institutions as follows:

- Fluid Power Training Lab, Milwaukee School of Engineering, USA.
- Fluid Power Research Lab, Concordia University, Montreal, Canada.
- Hydraulic Training Center, Egyptian Iron & Steel Co., Cairo, Egypt.
- Fluid Power Research Lab, Faculty of Engineering, Cairo University, Cairo, Egypt.
- Hydraulic & Pneumatic Labs Developed Industries Institute, Cairo, Egypt.
- Fluid Power Training Lab, Civil Aviation Authorization, Imbaba Airport, Giza, Egypt.
- Fluid Power Training Lab, Port Training Institute, Alexandria, Egypt.

Employment History:

July 2005 – Present	**Program Director of fluid Power Education.** Applied Technology Center, Milwaukee School of Engineering, Milwaukee, WI, USA. http://www.msoe.edu/seminars.
May 2003 – June 2005	**Power Plants Full-Scale Simulator Software Developer.** Power Systems Control and Simulation Department, CAE Inc., Montreal, Quebec, Canada. www.cae.com.
	Adjunct Assistant Professor. Department of Mechanical and Industrial Engineering, Faculty of Engineering and Computer Science, Concordia University, Montreal, Canada. https://www.concordia.ca/
Jan 2001 – May 2003	**Research Assistant, Part Time Faculty and Ph.D. Student.** Center of Industrial Control, Department of Mechanical & Industrial Engineering, Faculty of Engineering and Computer Sciences, Concordia University, Montreal, Quebec, Canada. https://www.concordia.ca/
June 1996 – Dec 2000	**Technical Office and Training Manager.** YFHE Co., Egyptian Agent of MANNESMANN REXROTH, the German manufacturer of Fluid Power Control Components and Systems, Cairo, Egypt. https://www.yasserfahmy.com/#/
June 1985 – June 1996	**Military Technical College.** http://www.mtc.edu.eg/ Lecturer at the Mechanical Engineering Department.
June 1983 – June 1985	**Maintenance Engineer.** Automotive Maintenance Engineer.

Current Job Duties and Responsibilities

Director of Professional Education & Research Development,
Applied Technology Center, Milwaukee School of Engineering, Milwaukee, WI, USA.

- **Strategic**:
  - Define the department vision/mission.
  - Strategic planning and setting up the department's short-term and long-term goals to maintain leadership in fluid power and motion control professional education.
  - Identify the technical training needs for industry clients.

- **Budget:**
  - Setup the department annual budget. Monitor and control the expenses in order to maximize the department's positive cash flow.

- **Technical:**
  - Develop, manage and teach basic to advanced courses for industry professionals.
  - Develop course manuals and presentation as necessary for interactive lecturing.
  - Develop lab manuals and laboratory curriculum for effective hands-on practicing.
  - Design and develop state-of-the-art training stands and educational software.
  - Develop and maintain course and instructor evaluation tools for improved delivery.
  - Involved in industry sponsored research project work through the renowned MSOE Fluid Power Institute®.
  - Work on getting the offered courses accredited by the relevant organization.
  - Participate in the relevant events, trade shows, and educational conferences.

- **Management:**
  - Set up seminars and being a host for seminar participants.
  - Collaborate with internal and external resources to run the seminars timely.
  - Report the department activities on quarterly bases to the dean of the applied research.
  - Follow up on competitors activates to maintain a better competitive situation in terms of the courses pricing, contents and the quality of the delivered material.
  - Maintain a reliable database for the customer base and the overall operation.

- **Marketing:**
  - Develop and maintain strong relationships with the customer base.
  - Develop and follow various marketing policies to maximize the department revenue.
  - Partnership with global professional development centers to extend the service to the international market.

Professional Membership & Certification:

- Certified Hydraulic Specialist by the International Fluid Power Society IFPS.
- Certified Accredited Fluid Power Instructor by the International Fluid Power Society IFPS.
- Member of Center for Compact and Efficient Fluid Power Eng. Research Center (CCEFP).
- Listed fluid power consultant by the National Fluid Power Association (NFPA).
- Member and Instructor, American Society of Mechanical Engineers (ASME).
- Professional Instructor at the North American Die Casting Association (NADCA)

Research Awards and Grants:

- 2021: Recipient of IFPS Hall of Fam, 2021.
- 2013: $200k MAHA Funds - Milwaukee School of Engineering - for building 4 basic trainers.
- 2012: Recipient of Otto Maha Pioneer in Fluid Power Award, 2012.
- 2010: $336K MAHA Funds - Milwaukee School of Engineering, Duplicate the Universal Trainer prototype.
- 2009: $120K CCEFP-NSF, Design and Development of "Universal Fluid Power Trainer".
- 2003: Post-Doctoral Industrial Research Fellow (IRF), Natural Sciences and Engineering Research Council of Canada, NSERC.
- 2001: First prize of the student design paper competition, International Conference on Multidisciplinary Design in Engineering CSME-MDE2001, November 21-22, Concordia University, Montreal, Canada.

Machine Design and Consultancy Work:

- Modeling and simulation of a hydro-pneumatic compressor for energy storage project for General Compression.
- Modeling and simulation of X-Pump for Ocean Pacific Technology. http://www.ocean-pacific-tec.com/.
- Design of Fluid Test Stand for Rohmax. http://www.rohmax.com/product/rohmax/en/Pages/default.aspx.
- Modeling, simulation and optimize the design of "Smart Flow Valve" to protect a hydraulic system from a catastrophic line failure. http://www.smartflowtechnologies.com/.
- Design Universal Fluid Power Trainer.
- Several hydraulic power units for various industrial applications.

Voluntary Workshops and Webinars:

- Chair of Education Program at CONEX-EXPO.
- Matlab-Simulink for Industrial Applications, Concordia University, Montreal, Canada.
- Overview of Industrial Pneumatics, NFAP, USA.
- Energy Saving Strategies for Hydraulic Systems, NFPA, USA.
- Overview of Hydraulic Systems, Penton Publications, NFPA, USA.
- Hydro-Mechanical vs. Electro-Mechanical Solutions, IFPS, USA.
- Hydraulic Pump Modeling for Application Engineers. IFPS, USA.

Software Copyright:

- "Med-Hyd", software for editing, design and simulation of hydraulic control systems. Reference number: 119/96. Registration date: 14 February 1996. Registration organization: Information and Decision Support Center (IDSC), Arab Republic of Egypt.
- Hydraulic Component Sizing Calculator, Congress Library, September 11, 2006 - Registration # TX-6-520-967.
- Introduction to Hydraulic Systems, Congress Library, February 2, 2007 - Registration # TX-6-509-982.

Presentation and Computer Skills:

- Medhat's presentation skills exceed the traditional skills of building power point, etc.
- Develop animated instructional modules.
- Develop course customization software tool that is used to present the training material, track the time, customize courses based on client's needs and much more.
- Oral presentation skills and techniques using body language to work with people of wide spectrum of backgrounds.
- Very computer literate: office, Visual Basic, Automation Studio, Matlab-Simulink and more.

Keynote Speeches:

- Military Technical College, Cairo, Egypt. MTC Scientific Conference, May 20-23, 2024. Title "Energy saving Roadmap for Hydraulic System Design" -
- King Khaled University, Abha, Saudia Arabia. Sustainable Energy and Environmental Solution Conference 2025 (SEESC Dec. 8-9, 2025) Title "The Human and the Energy"-

Personality:

- Mature and highly respect the value of the time.
- Adapted myself seamlessly in three different cultures: English in USA, French in Canada and Arabic in the Middle East.

Language Spoken:

Speak/Read/Write: English/Arabic.

Publications:

Journals Refereed Papers:

1. Medhat Khali, Hydraulic Pumps Static Characteristics Lumped Modeling for Application Engineers", Submitted for application at the **International Journal of Fluid Power**, July 2016.
2. M.K. Bahr Khalil and Don Lopper, "Hydraulic System Protection against Catastrophic Line Failure using Local Safety Valve", **International Journal of Fluid Power,** Vol. 9 #2, pp. 35-46, August 2008. **Germany**.
3. M.K. Bahr Khalil and Shajan John, "IESHYD010V01 - Hydraulic Components Sizing Calculator", **International Journal of Fluid Power**, Vol. 8 #3, pp. 65-67, November 2007. **Germany**.
4. M. K. Bahr Khalil, J. Svoboda and R.B. Bhat, "Modeling of Swash Plate Axial Piston Pumps with Conical Cylinder Blocks", **Journal of Mechanical Design**, ASME Transaction**,** Vol.126, pp 196-200, January 2004, **USA**.
5. M. K. Bahr Khalil, J. Svoboda and R.B. Bhat, "Dynamic Loads on the Drive Shaft Bearings of Swash Plate Axial Piston Pumps with Conical Cylinder Blocks", **CSME Transaction**, Vol.27 #4, pp 309-318, January 2004, **Canada.**
6. M. K. Bahr, J. Svoboda and R.B. Bhat, "Vibration Analysis of Constant Power Regulated Swash Plate Axial Piston Pumps" **Journal of Sound and Vibration**, Vol. 259(5), pp1225-1236, January 2003, **USA**.
7. M.K. Bahr Khalil, V. Yurkevich , J. Svoboda and R. B. Bhat "Implementation of Single Feedback Control Loop For Constant Power Regulated Swash Plate Axial Piston Pumps" **International Journal of Fluid Power**, Vol. 3 #3, pp27-36, December. 2002, **Germany**.
8. M. K. Bahr, "Geometrical Analysis of Four-Nozzle Pintle Hydraulic Servovalves", **Engineering Research Bulletin**, Vol. 2, pp102-115, 1991, Faculty of Engineering, Mataria, Cairo, **Egypt.**

Conference Proceedings:

9. M.K. Bahr Khalil, "ON THE MODELING OF HYDRAULIC PUMPS FOR APPLICATION ENGINEERS, ARTICLE #1" 53rd National Conference on Fluid Power, International Fluid Power Exhibition, IFPE 2011 Technical Conference, March 2014, **Las Vegas, NV., USA.**
10. M.K. Bahr Khalil, "Design Process of an Electro-Hydraulic Cylinder Position Feedback Control System" 52nd National Conference on Fluid Power, International Fluid Power Exhibition, IFPE 2011 Technical Conference, March 2011, **Las Vegas, NV., USA.**
11. M.K. Bahr Khalil, "Interactive Analysis of Closed Loop Hydraulic Control System", Proceedings of the Thirteenth International Conference on Aerospace Science & Aviation Technology, ASAT13, May 26 – 28, 2009, **Cairo, Egypt.**
12. M.K. Bahr Khalil, "Estimated versus Calculated Viscous Friction Coefficient in Spool Valve Modeling" Proceedings of the 51st National Conference on Fluid Power, International Fluid Power Exhibition, IFPE 2008 Technical Conference, March 2008, **Las Vegas, NV., USA.**
13. M.K. Bahr Khalil, "Innovative Tool for Custom Course Building and Delivery", **11th Annual World Conference on Continuing Engineering Education,** May 2008, **Atlanta, USA.**
14. Khalil, M.K., Deping Li and Bhat, R.B. "Controlling of Rolling Mills Operating Conditions Using Variable Displacement Pump and Electro-Hydraulic Pressure Compensator". 12th International Conference on Applied Mechanics and Mechanical Engineering AMME-12, May 16-18, 2006, Military Technical College, Cairo, **Egypt**.
15. M. K. Bahr, J. Svoboda and R.B. Bhat, "Experimental Investigation on Swash Plate Axial Piston Pumps with Conical Cylinder Blocks Using Fuzzy Logic Control" International Mechanical Engineering Congress and Exposition ASME-ME2002, November 17-21, 2002, New Orleans, **USA**.
16. M. K. Bahr, J. Svoboda and R.B. Bhat, "Dynamic Loads on the Drive Shaft Bearings of Swash Plate Axial Piston Pumps with Conical Cylinder Blocks", CSME Forum2002, May 21-24, 2002, Queen's University, Kingston, **Canada.**
17. M. K. Bahr, J. Svoboda and R.B. Bhat, "Response of Constant Power Regulated Swash Plate Axial Piston Pumps to Harmonic and Random Inputs", International Conference on Multidisciplinary Design in Engineering, CSME-MDE2001, November 21-22, 2001, Concordia University, Montreal, **Canada**. Winner of the first prize of the student paper competition.
18. S.A. Kassem and M.K. Bahr, "Fuzzy Logic Control of Constant Power Regulated Swash Plate Axial Piston Pumps", International Mechanical Engineering Congress and Exposition ASME-ME2001, November 11-16, 2001, New York, **USA**.
19. S.A. Kassem and M. K. Bahr, "On the Dynamics of Swash Plate Axial Piston Pumps with Conical Cylinder Blocks", Sixth Triennial International Symposium on Fluid Control Measurement and Visualization Flucome2000, August 13-17, 2000, Sherbrooke University, Sherbrooke, **Canada**.
20. S.A. Kassem and M. K. Bahr, "Effect of Port Plate Silencing Grooves on Performance of Swash Plate Axial Piston Pumps", 7th Mechanical Design and Production Congress MDP7, Pergamon Press139-148, February 2000, Faculty of Engineering, Cairo University, Cairo, **Egypt**.