



Hany Moustapha
Ph.D., FCAE, FASME, FCASI, FCSME

Professor and Director, AÉROÉTS
Executive Chairholder, NSERC/P&WC Industrial Research Chair in Propulsion System
École de technologie supérieure (ÉTS)
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- B.Sc. Cairo University (1970), M.Eng. and Ph.D. from McMaster University, Canada (1978)
- Joined Pratt & Whitney Canada (P&WC) in April 1978. Promoted to Senior Staff Specialist in 1989, to Chief, Turbine Aerodynamics in 1992, to Manager, Turbine Component Center in 1995 and to Senior Manager, P&WC Technology Office in 1999. Responsibilities at P&WC included managing the Technology, Collaboration & Technical Training Programs (1999-2009), technology interface & collaborations with universities, research centers, governments, UTC, NASA, Europe, etc. Named Senior Technology Advisor (January 2010-July 2011) and Senior Research Fellow (July 2011-present).
- Joined ÉTS in March 2010 as a Professor in the Département of Mechanical Engineering and Director of AÉROÉTS and the *Institut de conception et d'innovation en aérospatiale* (ICIA). Responsibilities include the establishment and promotion of ÉTS nationally and internationally as a world-class school offering a comprehensive and well integrated aerospace education, as well as research and management programs. In May 2011, named Executive Chairholder of the NSERC/P&WC Industrial Research Chair on Propulsion System Integration and Optimization.
- Cofounder (2002) and Honorary Member of the Consortium de recherche et d'innovation en aérospatiale au Québec (CRIAQ). Vice Chairman of the CRIAQ Board from 2002 to 2006 and currently a member of CRIAQ's Strategic and Research Committees.
- General Manager of the *Institut de formation aérospatiale* (IFA) (June 2010-2011). Currently Vice Chairman of IFA's Board of Administrators and a member of the Executive Committee (June 2011-present).
- Executive Director of the Green Aviation Research and Development Network (GARDN) (2009) and Board member of GARDN since 2010.
- President of the Montréal Aerospace Institute (MAI) (2004-2011), which coordinates internships between Aerospace Institutes at Concordia (CIADI), École de technologie supérieure (ICIA), Polytechnique (IICAP) and McGill (MIAE). Founded and Director of CIADI at Concordia University from 2000 to 2008.

- Chairman of Aéro Montréal's *Chantier Innovation* (2006-2009) and currently a member of Aéro Montréal's *Chantier Innovation and Chantier Relève et Main-d'oeuvre*.
- Member of the Ambassadors' Advisory Committee and Co-Chair of the Aerospace Committee of Palais des congrès de Montréal.
- Co-Chair of the Industry Canada and AIAC Technology Group for Future Major Platforms FMP (Nov. 2007-present).
- Chair of Industry Canada/AIAC Aerospace Review subcommittee on Technology Funding (Jan.-August 2012)
- Adjunct Professor at Carleton University, Rzeszow University of Technology (Poland) and Tecnologica de Monterey (Mexico)
- Distinguished Visiting Professor at Embry Riddle Aeronautical University (USA).
- Current Canadian member of NATO's Applied Vehicle Technology (AVT) Panel. Co-chair of NATO technology working group on "Advanced Propulsion Systems".
- Current Canadian member of the International Society of Air Breathing Engines (ISABE) and Vice-President from 2008 to 2009.
- Recipient of 30 national and international awards since 1980.
- Fellow of the American Society of Mechanical Engineers (ASME), the Canadian Academy of Engineering (CAE), the Canadian Aeronautics and Space Institute (CASI) and the Canadian Society of Mechanical Engineers (CSME).
- Invited keynote speaker at over 50 national and international conferences, on aero-engine design and technology, aerospace innovation and collaboration, workforce training and development, etc.
- Author and co-author of over 70 publications and two books on Gas Turbines.
- Former board member of the following organizations:
 - Conseil de la science et de la technologie (CST),
 - Conseil des partenaires de l'innovation (CPI),
 - Association de recherche industrielle du Québec (ADRIQ),
 - Association québécoise de l'aérospatiale (AQA),
 - Nano-Québec,
 - Centre technologique en aérospatiale (CTA),
 - Aerospace Industries Association of Canada (AIAC) Technology Council,
 - Conference Board of Canada Innovation Council,
 - NSERC Strategy for Partnership and Innovation,
 - NSERC committees for Engineering Design and Canada Research Chairs,
 - Canada Foundation for Innovation (CFI) Selection Committee,
 - NRC-IRAP,
 - PRECARN,
 - Innovation Management Association of Canada (IMAC).

Awards

2013	Chevalier de l'Ordre national du Québec
2012	The James C. Floyd Award (AIAC)
2012	Academic Leader Program, Tecnologico Monterey, Queretaro, Mexico
2012	CRIAQ Tribute Award
2012	Montreal Inspiration-Innovation Award
2011	Rendez-vous du Savoir homage as co-founder of CRIAQ: a Quebec model of industry/university collaboration
2011	GARDN Tribute Award
2011	Pratt & Whitney Canada Senior Research Fellow
2011	NSERC/P&WC Executive Industrial Research Chair on Propulsion System
2011	Montréal Club des Ambassadeurs Award
2010	Concordia University Long Service Award
2009	Concordia University Provost's Circle of Distinction Award
2009	Ryerson University Special Award
2008	CASI Senior McCurdy Award
2007	ADRIQ Prix Carrière industrielle 2007
2007	ASME Board of Governors Award
2006	Montréal Club des Ambassadeurs Award
2006	CRIAQ Award, for outstanding vision & contribution in establishing the consortium
2005	Ryerson University Honorary Doctorate
2005	Fellow, Canadian Academy of Engineering
2005	Egyptian Government Award for Technology Excellence
2004	Fellow, Canadian Society of Mechanical Engineers
2003	Concordia University Students Association Award, for most innovative contribution to Concordia: CIADI
2002	Concordia University Teaching Excellence Award
2001	Canadian House of Commons Awards, for outstanding academic and professional achievements
1999	Pratt & Whitney Principal Award, for world-class technical knowledge and Technology excellence
1999	Fellow, Canadian Aeronautics and Space Institute
1998	Fellow, American Society of Mechanical Engineers
1989	United Technologies Special Presidential Award
1987	Four NSERC Operating Grants (\$9,200 to 13,200 per year, 1987 to 2000)

- 1982 Fellowship in educational and teaching technology, Boston University
1980 Pratt & Whitney Aircraft Value Control Award

Publications (Top 20)

- S. H. Moustapha , N. Baines, D. Japikse and M. Zeleski, “Axial and Radial Turbines”, Concepts NREC Book, 2003.
- S.H. Moustapha, “Gas Turbines: Turbine Design”, Volume 3, Handbook of Fluid Dynamics and Fluid Machinery, John Wiley & Sons, 1996.
- M.W. Benner, S.A. Sjolander and S.H. Moustapha, “An Empirical Prediction Method for Secondary Losses in Turbines”, ASME Journal of Turbomachinery, 2006.
- M.W. Benner, S.A. Sjolander and S.H. Moustapha, “An Empirical Prediction Method for Secondary Losses in Turbines, A New Secondary Loss Correlation”, ASME Journal of Turbomachinery, 2006.
- D.B.M. Jouini, S.A. Sjolander and S.H. Moustapha, “Midspan Flow-Field Measurements for Two Transonic Linear Turbine Cascades at Off-design Conditions”, ASME Journal of Turbomachinery, 2002.
- M.W. Krieger, J-P. Lavoie, E.P. Vlastic and S.H. Moustapha, “Off-Design Performance of a Single Stage Turbine”, ASME Journal of Turbomachinery, 1999.
- M.W. Benner, S.A. Sjolander and S.H. Moustapha, “Influence of Leading Edge Geometry on Profile Losses in Turbines at Off-Design Incidence: Experimental Results and an Improved Correlation”, ASME Journal of Turbomachinery, 1997.
- E.P. Vlastic, S. Girgis and S.H. Moustapha, “The Design and Performance of a High Work Research Turbine”, ASME Journal of Turbomachinery, 1996.
- M. Badger, A. Julien, A.D. LeBlanc, A. Prahbu, A.A. Smailey and S.H. Moustapha, “The PT6 Engine ; 30 Years of Gas Turbine Technology Evolution”, ASME Journal of Gas Turbines and Power, 1994.
- S.H. Moustapha, W.E. Carscallen and J.D. McGeachy, "Aerodynamic Performance of a Transonic Low Aspect Ratio Turbine Nozzle", ASME Journal of Turbomachinery, 1993.
- M. El-Fouly and S.H. Moustapha, “Application of 3D Flow Analysis to the Design of a High Work Transonic Turbine”, CASI Journal, 1990.
- S.H. Moustapha, S.C. Kacker and B. Tremblay, “An Improved Incidence Losses Prediction Method for Turbine Airfoils”, ASME Journal of Turbomachinery, 1990.
- U.W. Schaub, R.G. Williamson, J.P. Huot and S.H. Moustapha, “An Experimental Assessment of the Influence of Downstream Conditions on the Performance of a Transonic Turbine Nozzle of High Turning”, ASME Journal of Turbomachinery, 1986.
- R.G. Williamson, S.H. Moustapha and J.P. Huot, “The Effect of a Downstream Rotor on the Measured Performance of a Transonic Nozzle”, ASME Journal of Turbomachinery, 1986.
- S.H. Moustapha, “Small Gas Turbines Technology Challenges”, AeroIndia 2009, CASI 2006 and ISABE 2003.
- S.H. Moustapha, et al., “Qualification by Analysis”, NATO-AVT092 Report, 2009.
- S.H. Moustapha, et al., “More Intelligent Gas Turbines”, NATO-AVT128 Report, 2009.
- S.H. Moustapha, et al., “Fuel Cells for Land, Sea & Air Vehicles”, NATO-AVT103 Report, 2006.

S.H. Moustapha, et al., “Turboshaft Engines Technology at Pratt & Whitney Canada”, CASI Symposium, Montreal, 1999.

S.H. Moustapha, et al., “The PW100 Engine; 20 Years of Gas Turbine Technology Evolution”, AGARD Symposium, Toulouse, 1998 and CASI Symposium, Calgary, 1998.

Major Contributions (1978-Present)

- 1- **Involved in all of Pratt & Whitney Canada’s turbine research, design and development projects from 1978 to 1999.** Received industry-wide recognition for introducing turbine novel designs and correlations into P&WC products. Managed the P&WC Turbine Component Center (aero, cooling, structure, air & oil system, installation & acoustics) from 1992 to 1999.
- 2- **Lead author of the “Axial and Radial Turbine “book** published by Concepts NREC in 2003 (last turbine book was published by Horlock in the 1950s). A well-recognized propulsion and turbine expert. Since 1983, taught at several Canadian universities, at Concepts NREC (USA) and in Europe. Full and short courses on Propulsion, Aero-Engine and Turbine Design are consistently well attended and popular. Active participant in ASME and CASI since 1983, and representing the Canadian aerospace industry on ISABE and NATO technology panel and working groups since 2000. Co-chair of current NATO technology working group on “Advanced Propulsion Systems”.
- 3- **Established in 1999 and managed the “P&WC Technology Management Office TMO” and “P&WC Technology Room”: an industry benchmark** for rigorous, lean structure and processes. Established “PWC Technical University” in 2000, putting together its structure, over 100 courses, handbooks, and achieving involvement from Bombardier and Bell Helicopter, as well as university students’ participation. This training organization is another industry benchmark and has been used as a model by other companies. Led its expansion to sharing industry courses between Montreal companies under an expanded mandate of the “Montreal Aerospace Institute” (MAI).
- 4- **Instrumental in positioning P&WC as a world-class model in industry/university collaboration:**
 - Increasing the company’s collaboration from 3 universities in 1991 (\$0.4M yearly budget) to 18 universities in 2009 (\$15M yearly budget).
 - In 2001, “P&WC Research Fellows” were introduced to recognize 7 university professors and one NRC scientist.
 - Championed the creation of P&WC Joint Industrial Chairs in Acoustics (2009, Sherbrooke Univ.) with Bombardier and Bell Helicopter and in Integrated Design of Efficient Aircraft with Bombardier (2010, École Polytechnique).
 - Introduced P&WC Targeted Scholarships with 10 universities for top graduate students working on P&WC research projects.
- 5- **AÉROÉTS**

Created AÉROÉTS in May 2010, to position ÉTS as a world-class school serving the aerospace industry. Since then, research funds and internship students has doubled. Pursuing a number of strategic partnership agreements with the local aerospace industry, as well as international organizations such as NASA, Airbus, MTU Aero Engines, Volvo Aero, Embry Riddle Aeronautical University, etc.
- 6- **Key driver and promoter of research and educational partnerships in the Canadian aerospace industry:**

- Co-founder of CRIAQ in 2001 (with Prof. J. Nicolas, Sherbrooke Univ.) and secured the first VRQ & FQRNT funding. Initiated the Annual Student Aerospace Forum (SAF) and PIRA Undergraduate Awards in 2003.
- Championed the creation of six Undergraduate Institutes: Concordia/CIADI (2001), ÉTS/ICIA and Ryerson/RIADI (2003), Polytechnique/IICAP (2005), Mexico/CEDIA (2007) and McGill/MIAE (2010). These institutes are a world-class model for industry/university partnerships for student training.
- Founder and Director of Concordia-CIADI (2001-2008). During this time, the Institute experienced growth from 26 to 147 students, \$350K to \$3M annual budget and 6 to 17 partners (including international partners).
- Initiated and chaired (2004-2011) the “Montreal Aerospace Institute” MAI, an umbrella organization for the four undergraduate Institutes in Montreal, notably expanding its scope to include industry-driven short courses. Secured an agreement with NSERC to enable companies participating in MAI to leverage the Undergraduate Students Research Awards (USRA).
- Co-Executive Director of BL-NCE GARDN (with F. Kafyeke, Bombardier). Led the organization through its start-up phase (incorporation, budget, partners, board membership, etc.) (2009-2010).
- Chairman of Aéro Montréal’s *Chantier Innovation* (2007-2009). During this time, two successful summits on Innovation (2007) and Training (2008) were organized, resulting in two white papers and concrete recommendations including SA²GE Demos and an expanded mandate for the MAI. A key contributor to securing the Quebec \$150M SA²GE technology demos in April 2010.
- Co-chair of the AIAC and Industry Canada Future Major Platforms (FMP) Technology Working Group since 2007, which aims to establish three major technology demonstrators.
- General Manager of the *Institut de formation aérospatiale* (IFA) from June 2010 to June 2011. Resolved issues with the organization’s governance to ensure industry leadership and led the organization to hold a successful first summit in Nov. 2010 on “Best Practices in In-Company Training”.
- Leading the establishment of a joint ÉTS and McGill University “Center for Aerospace Professional Education” (CAPE), in partnership with P&WC, Marinvent and Embry Riddle Aeronautical University. In addition, finalizing four major aerospace collaboration projects between ÉTS and McGill, as part of the recently signed 25-year agreement.
- Chair of Industry Canada/AIAC Aerospace Review subcommittee on Technology Funding (Jan.-August 2012). Published report included mapping the Canadian funding landscape, with clear recommendations to streamline the funding process and create new technology demonstrators and collaboration initiatives, while being fiscally neutral.
- Actively involved in formulating the required aerospace infrastructure as part of Quebec Strategy on Research and Innovation.
- Leading Aéro Montreal (cluster) project on increasing the innovation capacity of companies with an emphasis on small and medium enterprises.

7- **An Ambassador for the Montréal Aerospace Community:**

Truly passionate about aerospace, collaboration and Montréal. From 1999 to the present, initiated and actively involved in a number of activities with the goal of establishing Montréal as an “Aerospace Mecca” for collaboration and training.

- Began actively promoting Montréal in 2000 as an “Aviation Capital of the World”, most notably as the only city where an aircraft or a helicopter with all its components, could be designed, developed and manufactured within a radius of 30km. Branding of Montréal has been used since then, in the majority of aerospace brochures and promotional material about the city.
- Vigorously encouraging international organizations to hold their conferences in Montréal. This led to ASME holding its first Turbo Expo conference in Montréal at Palais des congrès (PCM) in 2007. This event was a resounding success attended by a record 3500 delegates, with a repeat in 2015. In the Fall of 2008, managed to promote and bring the NATO Fall meeting and technology conference to Montréal, with a repeat in Spring 2020. In the Fall of 2009, brought, for the first time in Canada, the International Society of Air-Breathing Engines (ISABE) conference to Montréal: another successful event with a repeat planned in Fall 2021.
- Invited speaker at numerous international Forums, promoting Montréal, its R&D capabilities, consortia, aerospace industry and educational institutions. Between 2006 and 2011, was an invited speaker at seven forums in France. In Paris (2007), addressed the senate at Palais de Luxembourg and spoke about Montréal being one of the three top aerospace clusters. Other overseas speaking assignments have included the U.S., Italy, Germany, India, China, Dubai, and Singapore.
- In recognition for bringing international conferences to Montréal, inducted as an ambassador for the Palais de congrès de Montréal in 2006. Selected in 2007 to represent the aerospace community on its advisory committee. In 2011, named as an Ambassadeur Émérite (highest level), for having brought more than one event and being actively involved in the PCM’s committees. In 2010, proposed the creation of a PCM committee for major aerospace events and assembled an elite group of representatives from industry, academia and consortia. The committee’s main objective is promoting Montréal as the ideal venue for aerospace events. Co-chairing the committee with Suzanne Benoit, CEO of Aéro Montréal. The committee was inaugurated in May 2011 and is meeting three times per year. A brochure was created about Montréal, the PCM and its committee for aerospace events. More recently, created a subcommittee of junior ambassadors from local aerospace companies.

Major Contributions (2007-Present)

Dr. Moustapha is truly passionate about aerospace and collaboration. The following is a listing of the top ten major projects undertaken, over the past five years, through which Dr. Moustapha has contributed to the aerospace industry, academia and collaboration.

1-AÉROÉTS

Dr. Moustapha created AÉROÉTS in March 2010, with a clear vision to position ÉTS as a world-class school serving the aerospace industry. Since then, he has signed a number of strategic partnership agreements with the local aerospace industry, as well as internationally with NASA, Airbus, MTU Aero Engines, Volvo Aero, Embry Riddle Aeronautical University, Tecnologica Monterey (Queretaro), Chalmers University (Sweden) and Sharjah University (Dubai). He was able to mobilize the 48 professors involved into aerospace research and teaching, as well as promote this sector to students at ÉTS and colleges. Due to his leadership the aero research funding and number of COOP aero students at ÉTS has more than doubled over past two years to reach a record \$4M/year and 410 students/year,

respectively. AÉROÉTS facilities represent an excellent model of an industry environment on the ÉTS campus.

2- P&WC-NSERC Executive Industrial Research Chair in Propulsion System

In May 2011, he was named Executive Chairholder of the NSERC/P&WC Industrial Research Chair on Propulsion System Integration and Optimization. This was the first Executive Chair in the aerospace research field in Canada and the only one in Quebec. The budget for this Chair is \$3M over 5 years. Since then, 20 graduate and undergraduate students have been working on 15 different projects at P&WC and at the new P&WC Advanced Propulsion Center, which he created at AÉROÉTS. All four students who have since graduated quickly found jobs in the aerospace industry.

3- Industry Canada Aerospace Review

He chaired Industry Canada/AIAC Aerospace Review subcommittee on Technology Funding (Jan.-August 2012). The published report included mapping the Canadian funding landscape, with clear recommendations to streamline the funding process and create new technology demonstrators and collaboration initiatives, while being fiscally neutral.

4- Institut de formation aérospatiale (IFA)

He was named General Manager of the *Institut de formation aérospatiale* (IFA) from June 2010 to June 2011 (one day per week), in order to resolve issues with the organization's human resources and governance and to ensure industry leadership. He led the organization of a successful first summit in Nov. 2010 on "Best Practices in In-Company Training".

5-Systèmes Aéronautiques d'Avant-Garde pour l'Environnement (SA2GE)

Since 2005, Dr. Moustapha has been promoting the creation of technology demonstrators, similar to the European model of "Clean Sky", as a normal evolution of CRIAQ. He was instrumental in drafting the AéroMontréal-CRIAQ proposal to create technology platforms for "avion plus écologique", now called SA2GE, which received funding in April 2010.

6-Green Aviation Research and Development Network (GARDN)

In 2009, he pursued the establishment of a business-led center of excellence on aerospace environmental technologies entitled "GARDN", and was appointed as Co-Director. In recognition for his contribution, Dr. Moustapha received the GARDN Tribute Award in February 2011.

7-Aéro Montréal

Dr. Moustapha was actively involved, representing P&WC, in the creation of the "Aéro Montréal" cluster. He was the first Chairman of the organization's *Chantier Innovation* from 2007 to 2009 and organized three successful Innovation Forums. He is an active member of *Chantier Innovation* and *Chantier Relève et main-d'oeuvre*. He is co-leader of the *Chantier Innovation* current project on "Doubling the Innovation Capacity of the Montréal Cluster".

8- Montréal Aerospace Institute (MAI)

After spearheading between 2000 and 2005, the creation of four undergraduate aerospace institutes in Montréal and Toronto (Concordia-CIADI, ÉTS-ICIA, Ryerson RIADI and Poly-IICAP), McGill-MIAE was created in 2010. He is the founder and served as Chairman from 2000 to 2011 of the "Montréal Aerospace Institute", an umbrella for the four Montreal undergraduate institutes, which has become a world-class model for industry/university collaboration for undergraduate training.

9-Consortium de recherche et d'innovation en aérospatiale du Québec (CRIAQ),

Dr. Moustapha, as co-founder of CRIAQ in 2002, received a special recognition award at the October 2011 *Rendez-vous du Savoir* as the best Quebec model for industry-university collaboration. He also received the CRIAQ 2012 Tribute award, on the 10th CRIAQ anniversary for his outstanding vision & contribution in establishing the consortium.

10-Seven Major Conferences to Montréal

Dr. Moustapha was able to bring seven major conferences to Montréal and to its Palais des congrès (PCM) between 2007 and 2021. In recognition for his efforts in bringing international conferences to Montréal, Dr. Moustapha was inducted as an ambassador for the Palais de congrès de Montréal in 2006. He was selected in 2007 to represent the aerospace community on its advisory committee, where he has been active since. In 2011, he was named as an Ambassadeur Émérite (highest level), for having brought more than one event and being actively involved in the PCM's committees. In 2010, he proposed the creation of a PCM committee for major aerospace events and assembled an elite group of representatives from industry, academia and consortia. The committee's main objective is promoting Montréal as the ideal venue for aerospace events.