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PROFILE

Senior engineering professional of international repute with more than 30 years of industrial, research, technology development and teaching experience. Skilled strategist who transforms strategic plans into operational solutions with benchmark performance-based outcomes. High-performing Science & Technology (S&T) manager with expertise in conceptualizing, developing and executing externally funded programs. Proven leader capable of mobilizing multi-disciplinary teams and multimillion-dollar assets to produce measurable and high impact results. Subject matter expert in the area of sustainable fuels, efficient energy conversion, combustion control for propulsion and power and burner/injector design.

DEMONSTRATED ACHIEVEMENTS

- Generated sustained external funding in the order of $5M per year by establishing strategic sponsorships with multiple US and Canadian federal departments and industrial entities.
- Led the maturation of laser-based optical diagnostics to reduce the time for experimental testing by greater than 50%.
- Provided visionary leadership and strategic vision in mobilizing multi-disciplinary teams to achieve world class accomplishments like the world-first 100% biofuel flight.
- Led the development and accreditation of a future-focussed undergraduate curriculum in Aerospace Engineering.

CORE COMPETENCIES & Skills

- Alternative fuels qualification
- Control of combustion instabilities
- Laser-based optical diagnostics
- Thermal systems engineering and integration
- Technology development and demonstration
- Application-based teaching in engineering
- Strategic research planning
- Sponsored program management
- Project management and real world design
- Team leadership, mentorship and advice

INDUSTRIAL & RESEARCH EXPERIENCE

2018 - 2020

Program Director (Currently on Leave of Absence)

National Research Council of Canada

Integrated Autonomous Mobility Program – on promoting the use of unmanned aircraft systems

Establish the research program, set target outcomes and monitor key performance indicators; build and lead multi-disciplinary, inter-departmental research teams; manage interactions with external stakeholders; consult and bring together government, academic and business partners and stakeholders; develop strategic program plans and the associated metrics for discovery oriented work; develop supporting projects, and then manage the program towards achievement of the target outcomes; manage financial and human resources; manage partnerships, contributions and intellectual property ownerships; generate external sponsorships.

Key Achievement: Built a strategic research and innovation program with a budgets of over $100 million, with 70% contributions from externally committed sponsorships.

2016 - 2018

Executive Strategic Advisor

Aerospace Research Center, National Research Council of Canada

Prepared strategy plans; reviewed policies and programs related to R&D and innovation; provided strategic advice and counsel to senior level executives including the President, the Vice President and the Director General; advised other government departments and agencies on S&T matters related to sustainable energy solutions; developed technology roadmaps; assembled multi-functional project execution teams comprising internal staff, academic experts and industrial clients; advised regulatory agencies on qualification and certification.

Key Achievement: Developed a 5-year, $450M Strategy Plan that ensured an increase in the Research Center revenues at a cumulative annual growth rate (CAGR) of 8% in addition to a reduction in asset maintenance expenditure by 35%.

2013 - 2016

Program Leader

National Research Council of Canada

Aeronautics for the 21st Century Program – on developing the next generation of commercial aircraft technologies

Conceptualized, developed and lead R&D program; prepared program business, implementation and operational plans; defined portfolio of technologies to deliver on the program value proposition and outcomes; formulated consortia and collaborations; negotiated contracts; conducted business development; mobilized multi-disciplinary teams and managed multimillion-dollar budget; initiated national and international outreach to

materialize co-funding opportunities; generated external sponsorships; managed intellectual property portfolio and technology transfer.

Key Achievements:

- Established successful sponsorship agreements with a number of US and Canadian entities, resulting in sustained revenues in the order of $5M a year.
- Negotiated successful licensing agreements, leading to royalty revenues of more than $2M

2011 - 2013 **Group Leader, Research & Development**
Gas Turbine Laboratory, National Research Council of Canada

Managed gas turbine research portfolio and facilities at the operational unit level; initiated sustainable jet fuel research and industrial qualification program at NRC; developed staff expertise and competencies; developed staff development and mentorship programs; managed upgrades and procurement of laboratory equipment; managed R&D and maintenance budgets for the research team.

Key Achievements:

- Led a multi-disciplinary teams to achieve the world-first 100% biofuel flight, earning the Canadian Public Service Award of Excellence for Scientific Contributions in 2013.
- Established the sustainable aviation fuels combustion program that led to 3-years collaborative agreement with US Federal Aviation Authority's National Jet Fuel Combustion Program

2008 - 2011 **Senior Research Officer**
Gas Turbine Laboratory, National Research Council of Canada

Conceptualized and executed applied research projects in the areas of sustainable fuels, energy conversion and reactor/injector designs; generated and disseminated advanced learning at conferences and through publications; managed client-related projects; conducted business development for public-private funded projects; mentored junior researchers; co-supervise university students; initiated collaborations with universities, government agencies and small and medium-sized enterprises.

Key Achievement: Developed a Dielectric Barrier Discharge based actuation system to control flame flashbacks in combustors that led to a US patent application.

2005 - 2008 **Associate Research Officer**
Gas Turbine Laboratory, National Research Council of Canada

Conducted applied research related to gas turbine combustion, sprays and atomization; developed proposals for new initiatives; managed project and provided technical/research services to clients; demonstrated research excellence in the form of high-impact and application-focused publications; and contributed to the development of new technologies and validation of existing technologies for new applications.

Key Achievements:

- Introduced process automation in the laboratory, cutting down the labor resource requirement to conduct experiments by 40%.
- Established new laser diagnostics and acoustic measurement capabilities in the laboratory, hence attracting new business valued at $500k/year.

1992 - 1994 **Manager Engine Overhaul Facility**
Air Maintenance Depot, Government of Pakistan

Established and managed engine repair and overhaul facility with over 100 personnel; developed procedures for total quality management and logistics administration; optimized overhaul schedule; conducted quarterly reviews; oversaw engine reliability program; conducted design change activities to support life improvements of parts; liaised with engine OEM.

Key Achievement: Demonstrated in the first two years of facility operation a cost saving of 20% and a time saving of 40% to overhaul an engine.

1988 – 1992 **Assistant Manager – Hot Sections Overall**
Air Maintenance Depot, Government of Pakistan

Managed the repair and life extension operation; developed work instructions for shop processes; handled components and parts sourcing; prepared reports for quarterly reviews; maintained work scope planning guide documents and production schedules.

Key Achievement: Introduced Critical Path Management (CPM) and Project Evaluation and Review Technique (PERT) to the management of shop activities, hence increasing the productivity by 10% and reducing time to repair by 25%.

1984 – 1988 **Fleet Engineering Officer**
Flight Squadron, Government of Pakistan

Managed aircraft frontline maintenance unit; ensured readiness and reliability of operational assets; maintained flight and ground safety; developed maintenance schedules and training plans for aircraft technicians.

Key Achievement: Led the unit to maintain an excellent fleet reliability and ground safety record, earning Achievements Awards two years in a row (1987 and 1988).

ACADEMIC EXPERIENCE

2020 - Present

Professor
Department of Mechanical Engineering, Colorado State University

2008 - 2020

Industrial Advisor to Academia
University of British Columbia, Virginia Polytechnic Institute & State University, McGill University, Polytechnique Montreal, Carleton University, Western University, Queen's University and University of Toronto.

Co-supervised eight Master's theses and one PhD dissertation:

- Flame blowout and flashback detection system development.
- Experimental investigation of acoustic streaming flow inside standing wave tube.
- Boundary layer flashback control by plasma actuation in pre-mixer of the combustion chamber.
- Effects of fuel composition on the response of an acoustically excited flat flame.
- Experimental and numerical investigation of bubble dynamics in effervescent atomizers.
- Development of an air-fuel control system for effervescent atomization fuel injector.
- Multi-disciplinary and multi-objection optimization tool for designing adaptive structures.
- Stimuli-responsive morphing materials.
- Spray dynamics in engine afterburners.

2005 - 2008

Part-Time Faculty (Visiting)
Carleton University & Royal Military College Canada

Taught undergraduate and graduate courses in Thermodynamics and Combustion.

2003 - 2005

Part-Time Faculty (Lecturer)
Virginia Polytechnic Institute & State University

Taught undergraduate courses in Heat/Mass Transfer and Fluid Mechanics during Summer terms

1996 - 2000

Assistant Professor
Department of Aerospace Engineering, College of Aeronautical Engineering, National University of Science & Technology

Taught undergraduate-level courses in thermal sciences, fluid mechanics, propulsion and power and flight dynamics.

Supervised Senior-year individual research and design team projects.

Served as the Undergraduate Program Coordinator advising student on academic plans scheduling of courses, developing curriculum, administering awards process and participating in accreditation committees.

Key Achievement: Redesigned the aerospace engineering curriculum to prepare graduates for the early 21st century, and led the process for ABET accreditation

EDUCATION

2001 – 2005 **Doctor of Philosophy, Mechanical Engineering**

Virginia Polytechnic Institute & State University, Blacksburg, VA, USA

1994 – 1996 **Master of Science in Engineering, Aerospace Engineering**

University of Michigan, Ann Arbor, MI, USA

1989 - 1991 **Master of Business Administration, Finance**

University of Karachi, Karachi, Pakistan

Professional Development Learnings

2018 **Diversity and Inclusion Training**

Canada School of Public Service, Ottawa, ON, Canada

2016, 2013 & 2010 **Occupational Health & Safety Management**

Canada School of Public Service, Ottawa, ON, Canada

2013 **Program and Project Management**

George Washington University, School of Business, Washington, DC, USA

2013 **SAP Project Management**

National Research Council Canada, Ottawa, ON, Canada

2010 **Executive Certificate in Management and Leadership**

MIT Sloan School of Management, Boston, MA, USA

2008 **Leadership and Management Development Program**

National Research Council Canada, Ottawa, ON, Canada

CURRENT PROFESSIONAL ACTIVITIES

Member of Advisory Committees

- US Department of Energy (Advisory Board for High-Performance Fuels)
- US Federal Aviation Administration (National Jet Fuels Combustion Program)
- Standards Council of Canada (CAC-ISO-TC192)
- Department of National Defense (Alternative Fuels Task Force)
- Natural Sciences & Engineering Research Council (Green Aviation R&D Network)
- Transport Canada (Aviation Noise and Emissions Committee)
- Natural Resources Canada (Impact Canada Innovation Challenge on Biojet Fuels)
- NRC Early Career Network Mentorship Advisory Council

Member of Professional Committees

- American Society of Mechanical Engineers
- International Gas Turbine Institute
- American Helicopter Society International (Vertical Flight Society)
- Gas Turbine for Energy Network
- Combustion Institute International
- American Institute of Aeronautics and Astronautics

AWARDS & RECOGNITIONS

2015	Outstanding Achievement Award for Contribution to Industry and Technology Transfer.
2013	Public Service Award of Excellence for Scientific Contributions.
2016, 2000, 1987 and 1988	Service Excellence Appreciation Awards.

SCIENTIFIC & TECHNICAL PUBLICATIONS

Sample publications:

- Corber, A., **Chishty, W. A.**, Rizk, N., 2019, "Experimental and Analytical Characterization of Alternative Aviation Fuel Sprays under Realistic Operating Conditions," *J. Eng. Gas Turbines Power*, **141**(6)
- Canteenwalla, P. and **Chishty, W.**, 2017, "Investigation of Engine Performance at Altitude using Selected Alternative Fuels for the National Jet Fuels Combustion Program," *55th AIAA Aerospace Sciences Meeting, Grapevine, TX*, **AIAA 2017-0150**

- Jobehdar, M.H., Siddiqui, K., Gadallah, A.H. and **Chishty, W. A**., 2016, "Bubble formation process from a novel nozzle design in liquid cross-flow," *International Journal of Heat and Fluid Flow*, **61**(Part B), pp 599-609, https://doi.org/10.1016/j.ijheatfluidflow.2016.07.004
- Chan, T., **Chishty, W.**, Davison, C., and Buote, D., 2015, "Characterization of the Ultrafine and Black Carbon Emissions from Different Aviation Alternative Fuels," *SAE Int. J. Fuels and Lubricants.* **8**(3), pp 515-526
- Gorski, J., **Chishty, W. A**. and Johnson, M., 2014, "Flame Response Analysis of Syngas," *ASME Turbo Expo 2014: Turbine Technical Conference and Exposition, Düsseldorf, Germany*, **GT2014-25409**
- Jobehdar, M. H., Gadallah, A. H., Siddiqui K. and **Chishty, W. A**., 2013, "Investigation of the Bubble Formation in Liquid Cross-Flow Using a Novel Nozzle Design," *ASME 2013 Fluids Engineering Division Summer Meeting, Incline Village, NV*, **FEDSM 2013-16498**
- Versailles, P., **Chishty, W. A.**, Vo, H. D., 2012, "Application of Dielectric Barrier Discharge to Improve the Flashback Limit of a Lean Premixed Dump Combustor," *J. Eng. Gas Turbines Power*, **134**(3)
- **Chishty, W. A.,** Lepera, S. D. and Vandsburger, U., 2011, "Spray Combustion Dynamics under Thermoacoustic Oscillations," *International Journal of Mechanical and Mechatronics Engineering*, **5**(1)
- Nabavi, M., Siddiqui K. and **Chishty, W. A**., 2009, "3-D Simulations of the Bubble Formation From a Submerged Orifice in Liquid Cross-Flow," *ASME 2009 Fluids Engineering Division Summer Meeting, Vail, CO*, **FEDSM2009-78307**
- **Chishty, W. A.**, Yimer, I., 2008, "Optimizing Mixing for Maximum Damping of Fuel-Air Ratio Oscillations in Gas Turbine Premixers," *ASME Turbo Expo 2008: Power for Land, Sea, and Air, Berlin, Germany*, **GT2008-50454**
- **Chishty, W. A.**, Yimer, I., Furi M. and Bourque, G., 2007, "Experimental Characterization of the Damping of Fuel-Air Ratio Fluctuations Using Transfer Function Analysis," *ASME Turbo Expo 2007, Montreal, QC*, GT2007-27937
- **Chishty, W. A.**, Vandsburger, U., Saunders, W. and Baumann, W., 2004, "Effects of Combustor Acoustics on Fuel Spray Dynamics," *ASME 2004 International Mechanical Engineering Congress and Exposition, Anaheim, CA,* **IMECE2004-61325**