

An Electronic Fireside Chat with Professor Cristina Amon

Meaghan Ziemba, Associate Editor, PD&D

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Professor Christina Amon, Dean of the Faculty of Applied Science & Engineering, University of Toronto

Professor Cristina Amon is the Dean of Faculty of Applied Science and Engineering at the University of Toronto. She recently received the 2011 Achievement Award from the Society of Women Engineers for her groundbreaking contributions to the field of fluid mechanics and heat transfer; achievements in integration of practice, research, and education; and active commitment to gender diversity in engineering.

Product Design and Development (PD&D): Can you briefly describe your background?

Professor Cristina Amon: I was born in Uruguay, and then moved to Venezuela, where I obtained my undergraduate degree in Mechanical Engineering at Universidad Simón Bolívar in Caracas after two years of engineering work experience. I continued my studies at the Massachusetts Institute of Technology. I completed my Master's Degree under the supervision of Professor Bora Mikic and my Doctor of Science under the supervision of Professor Mikic and Professor Anthony Patera. From an early age, I became interested in becoming an educator. My interest in science and engineering was inspired by one of my own female teachers while a young girl in Uruguay. This special, mentoring relationship helped

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Published on Industrial Maintenance & Plant Operation (<http://www.impomag.com>)

me recognize the positive influence that strong role models can have on young women.

PD&D: Can you describe what your major contributions are in the heat transfer and fluid mechanics industry, and how they have changed or helped advance the industry?

Professor Cristina Amon: My research has focused on the development of Computational Fluid Dynamics (CFD) for formulating and solving thermal design problems subject to multidisciplinary competing constraints.

This led to the creation of a multi-stage concurrent thermal design methodology based on hierarchical model refinement, which combines CFD, non-deterministic experiments and Bayesian statistics. My research has advanced the scientific foundation of heat transfer enhancement by flow destabilization and hemodynamics mass transport in biological systems, including aortic aneurysms and intravenous blood oxygenators.

This work has also led to contributions to concurrent thermal designs, innovation in electronics cooling and transient thermal management of wearable computers. More recently, my research group has been focused on developing numerical algorithms for sub-micron and nano-scale heat transport in semiconductors (molecular dynamics, lattice-Boltzmann method and phonon Boltzmann transport), which will enable the development of the next generation of electronics.

PD&D: What are the technical societies that you belong to, and how do they help shape you as a professional and/or the ideas you have?

Professor Cristina Amon: I am a member of several organizations, including:

- American Association for the Advancement of Science (AAAS);
- American Society for Engineering Education (ASEE);
- American Society of Mechanical Engineers (ASME);
- Canadian Academy of Engineering (CAE);
- Institute of Electrical and Electronic Engineers (IEEE);
- National Academy of Engineering (NAE);
- Royal Society of Canada (RSC); and,
- Society of Women Engineers (SWE).

My participation in these organizations is important for several reasons. Most

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importantly, it allows me to give back to my profession and, I hope, inspire younger generations, particularly women, to become engineers.

PD&D: What are the outreach programs you have, and in what ways do they help increase faculty diversity, address gender disparities among undergraduate students; and how do they promote engineering to women?

Professor Cristina Amon: At U of T Engineering, we are devoted to many outreach efforts, which not only seek to reach out to women, but other groups that are underrepresented in the engineering profession.

Among our many programs is Girls' Science & Engineering Saturdays, whose goal is to encourage and inspire interest in engineering, science and technology in a confidence-boosting, all-women environment. As well, in partnership with the University of Toronto Chapter of the National Society of Black Engineers (NSBE U of T), we have recently established an interactive program for students in grades 7 and 8 called ENGage. In this program, we seek to foster interest in engineering and science, while engaging participants in a range of personal development activities throughout the weeklong program.

While our outreach programs are important tools to promote engineering to women, I firmly believe that strong and visible women role models are an essential part of encouraging more young women to choose engineering as a profession. Our growing complement of women faculty are not only devoted educators and acclaimed researchers, but are also inspiring role models for our prospective and current students. Recruiting, retaining and promoting remarkable female faculty members continues to be a strategic focus for the Faculty.

In addition, more and more women are assuming academic leadership positions within the Faculty. If we look at the number of women engineers in academic administrative roles at the University of Toronto, it has increased from 0% in 2006 to 27% in 2010. That's real progress. And with the help of my excellent colleagues at U of T Engineering, we're continuing to push that number up.

PD&D: Why do you feel it is important to address the issues mentioned in the previous question? In what ways have you seen improvements among these particular areas?

Professor Cristina Amon: U of T Engineering is home to students and faculty from a variety of backgrounds. Our students come from more than 100 different countries, representing more than half of the world's nations. This diversity enhances the innovation, discovery and learning that take place on campus. We not only welcome the world into our classrooms, but also prepare graduates to apply engineering solutions to the world's challenges in the global market.

And as the world's challenges are becoming more complex, it becomes more vital that we bring a diversity of viewpoints to solving them, and certainly women and engineers from a variety of backgrounds become more important than ever.

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Over the years, I have sought to lead by example in hopes that others may see engineering as an exciting career choice and a rewarding profession. I have seen a lot of progress since I first began my studies in the late 1970s in Venezuela. While I appreciate there is still progress to be made, I think there is an awareness of the important role women play in engineering that wasn't present before.

PD&D: What are some of the current projects you are working on today?

Professor Cristina Amon: U of T Engineering has recently undertaken a number of initiatives to reinforce our cultural diversity, which enriches our students' learning experiences. For instance, the MITACS Globalink program brings top Indian undergraduates to the Faculty for summer research internships. At the same time, our students can study abroad through our new Structured Exchange Pathways program. Our global perspective is also reflected in our curriculum, including a Global Engineering certificate in our Master of Engineering program. Student learning outside of the classroom is also supported by internships abroad and by many of our student clubs, more than a half-dozen of which have a cultural or international focus. In addition, the international focus of our research is supported through our new Centre for Global Engineering (CGEN).

In terms of research activities, I am leading a new project called Distributed Generation for Remote Communities, which seeks to provide green energy solutions to Canada's remote villages. Our aim is to provide renewable energy solutions to more than 150 aboriginal communities that are currently dependent on diesel generators for their energy needs. The project has received \$1.65-million in funding from the Natural Sciences and Engineering Research Council of Canada (NSERC). More information is available here:

http://www.engineering.utoronto.ca/About/Engineering_in_the_News/U_of_T_Engineers_Awarded_1_65M_NSERC_Grant.htm [1]

PD&D: What are some of your major goals that you have for yourself and for the groups you are involved with?

Professor Cristina Amon: I seek to contribute my skills and expertise as an engineer to improve society and the world in whatever way I can. I view that as a personal goal, and I hope it is a goal shared by any organization in which I am involved.

PD&D: Anything else you would like to comment on or add, or feel is important for the PD&D readers to know?

Professor Cristina Amon: The Faculty of Applied Science & Engineering at the University of Toronto is the premier engineering institution in Canada and among the very best in the world. With 5,090 undergraduates, 1,843 graduate students and 235 professors, U of T Engineering is at the fore of innovation in engineering education and research.

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Source URL (retrieved on 12/20/2014 - 10:20am):

<http://www.impomag.com/blogs/2011/12/electronic-fireside-chat-professor-cristina-amon>

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