Up-and-Coming Researchers in the Welding Industry

As part of our celebration of the American Welding Society's centennial, the* Welding Journal *has been telling stories of events and people from the Society's past, as well as those who are contributing to its future. In this issue, we talked to up-and-coming researchers in the welding industry.

Few sign up to the welding industry for a glamorous lifestyle or generous dental plan. They do it to gain insights and knowledge and, they hope, to build the industry up again.

The *Welding Journal* reached out to some up-and-coming researchers in the welding industry who are emerging as leaders in their fields. The profiled researchers have shown year-on-year citation growth. Bringing fresh ideas, initiative, and curiosity in a competitive research environment, these newcomers are making their mark in the welding community.

Gentry Wood: Deep Thinker

Over the course of earning his undergraduate degree, Gentry Wood participated in a Faculty of Engineering initiative to get undergraduate students involved in extracurricular research projects. This is where he was first introduced to welding.

"I met my future PhD advisor, Dr. Patricio Mendez, and was impressed by his outstanding research lab and his passionate team of graduate students. I completed four projects over the four final semesters of my degree on a range of topics all linked to what eventually became the topic of my PhD," Wood explained.

Wood received his bachelor of science degree in materials engineering from the University of Alberta in 2012 and remained at the university to pursue his PhD in materials engineering under Mendez at the Canadian Centre for Welding and Joining (CCWJ).

A prominent researcher himself, Professor Mendez is the Weldco/Industry chair in welding and joining and director of CCWJ at the University of Alberta. His teaching and research focus on the physics and mathematics of welding and materials processing, including heat transfer, magnetohydrodynamics, arc plasma, thermodynamics, and kinetics. Mendez would be a common thread to the profiled researchers.

"In the summer, Dr. Mendez made an introduction to a local company called Apollo-Clad Laser Cladding. The company was using high-powered lasers to apply state-of-the-art weld coatings — a dream job for a young materials engineer such as myself," Wood recalled.

The company, which manufactures and repairs components for the oil and gas industry using laser cladding and additive manufacturing, expressed interest in having a PhD engineer in the field of laser technology. Apollo-Clad sponsored Woods' PhD at the CCWJ to help them better understand the engineering fundamentals of the laser cladding process.

Gentry Wood seeks a deeper understanding of the laser cladding process in welding.

Wood has worked for the company for three years as lead engineer since completing his doctorate in February 2017. Having completed his PhD thesis project in the field of modelling of the laser cladding process for applying wear-resistant metal matrix composites, he continues to research the laser cladding process.

Throughout his education and career, Wood has published papers in the *Welding Journal*, *Soldagem e Inspeção* in Brazil, *Science of Technology of Welding and Joining*, and the Canadian Welding Bureau (CWB) Association's *Weld* magazine.

Wood has also become well known in the welding research community for his deep thinking and leadership skills. According to Mendez, Wood brought in close to $1

million CAD to the lab in research funding. Additionally, in his first few months at Apollo-Clad, his work generated savings and additional income.

"In the first six months following graduation, I was given the task of shadowing our laser cladding operators to see if I could improve our current production processes. I quickly realized that simple positional parameters of the process varied greatly between operators that lead to differences in part completion times and quality," said Wood. By measuring and standardizing important parameters, "…we were able to achieve 30–40% reduction in part completion times for a wide range of high-volume components that are manufactured at our facility. For laser cladding…, it represented a significant improvement in our ability to apply our laser clad coatings to large surface areas."

This accomplishment was recognized by the CWB Association in 2018, where Apollo-Clad received the Praxair Productivity Award for all of Canada.

Wood hopes to write a book for engineers on the laser cladding process that provides simple, accurate, and reliable equations to predict meaningful process outputs.

"There is no definitive textbook that gives engineers the tools to easily calculate process outputs like the size of a laser clad bead from theory. Today's practitioners either turn to complex simulations or exhaustive experiments," he said. "…I have been studying this process for almost eight years now, and I feel I have a lot to say. The challenge now has become to write it all down." WJ

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WELDING Journal

DECEMBER 2019

American Welding Society®
CELEBRATING 100 YEARS
SINCE 1919

- Industry Spotlight: Aerospace
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PUBLISHED BY THE AMERICAN WELDING SOCIETY TO ADVANCE THE SCIENCE, TECHNOLOGY, AND APPLICATION OF WELDING AND ALLIED JOINING AND CUTTING PROCESSES WORLDWIDE, INCLUDING BRAZING, SOLDERING, AND THERMAL SPRAYING