

THE ADVANCED SURFACE RESEARCH GROUP

R&D Leaps Ahead at Electronics Inc.

INNOVATION WASN'T DORMANT at Electronics Inc. (EI) during the COVID-19 pandemic. EI's Advanced Surface Research Group, comprised of Taylor Bowman, Kenneth Derucki, Siavash Ghanbari, and Erik Waelchli, have been developing new products and technologies that will benefit the shot peening industry. The following are biographies of each team member and the group's contributions to the advancement of surface treatment.

BIOGRAPHIES

Taylor Bowman

Ms. Bowman graduated from Purdue University in 2021 with a Bachelor of Science degree in Electrical Engineering. She minored in creative and technical writing. She began at EI as an engineering intern in 2017 before working at EI full-time as an electrical engineer after graduation. Ms. Bowman's focus is on advanced process control methods for shot peening machines.



Kenneth Derucki

Mr. Derucki graduated from Purdue University in 2020 with a degree in Electrical Engineering. He started at EI as an engineering intern in 2019 before starting to work full-time at EI after graduation. He is an electrical engineer at EI and his responsibilities include working as the primary engineer on a sensor project and coordinating the activities of the production and engineering departments to ensure accurate quality testing.



Siavash Ghanbari, PhD

The relationship between Dr. Ghanbari and the EI staff began when Dr. Ghanbari led research projects for EI at the Center for Surface Engineering and Enhancement (CSEE) program at Purdue University. (CSEE was created to assist industry and federal agencies in research, training and information in surface-enhancing processes that optimize material structural performance.) Dr. Ghanbari was a Postdoctoral Researcher at Purdue at that



time, specializing in the design of electronics control units and sensors, the development of software and computational modeling for shot peening process control, and analyzing the flowability of aluminum and copper powders in additive manufacturing.

As a Graduate Research Assistant at Purdue, Dr. Ghanbari worked on additional projects related to surface enhancement including fatigue crack initiation and propagation analysis, residual stresses, yield stresses and plastic deformation measurements using nano-indentation and FEM modeling; novel experiments to measure residual stresses after severe plastic deformation using X-ray method and nano-indentation; and numerical and experimental analysis to improve surface roughness and residual stress after plastic deformation. Dr. Ghanbari has also authored and co-authored 14 published papers. (Several of the papers are available for download at www.shotpeener.com.)

The management team at EI was so impressed with Dr. Ghanbari's work at Purdue that they offered him a position to head the EI Advanced Surface Research Group.

Erik Waelchli

Mr. Waelchli has an extensive background in engineering, factory automation, machine-tool manufacturing, and tool and die manufacturing. He holds an MBA from the University of Notre Dame, a Bachelor in Mechanical Engineering from the College of Engineering at HTL Brugg-Windisch in Switzerland, and he is a certified tool-maker. He served as an officer in the Swiss Army at the rank of Lieutenant-Captain of Material Logistics. Mr. Waelchli is fluent in German, Swiss-German, English and French.

Mr. Waelchli works as a liaison between the Advanced Surface Research Group, CSEE at Purdue, and the EI engineering department. His main responsibility is to optimize the production methods of the EI Almen strip.



PRODUCTS AND PROCESSES IN R&D AT ELECTRONICS INC.

Almen Strips

The Almen strip is the most commonly used tool to quantify the intensity of the shot peening process. Dr. Ghanbari and Mr. Waelchli, along with a CSEE research team at Purdue, are

studying the interaction between the flatness and hardness of an Almen strip and their effect on the consistency in the shot peening process. Their goal is to develop the next generation of Almen strip that will surpass the needs of critical industries, including medical and aerospace.

Fine Particle Media

Shot peening with fine particle media is widely used in aerospace and automotive applications such as transmission gears for a luxury automobile manufacturer. The EI R&D group, headed by Mr. Derucki, is working with an international partner to develop process controls that will optimize the use of this media.

Velocity Control

Ms. Bowman is developing a new method of gathering shot velocity data that will provide consistent and accurate velocity readings.

Why Our Industry Thrives on Research and Development

Tom Brickley, Vice President at Electronics Inc., said, “We recently got a phone call from a manufacturing company that needs help developing a better shot peening process that will literally save lives. This is just one example of why we formed the Advanced Surface Research Group. We’ve assembled the best and brightest talent because we are seeing tremendous opportunity from companies that recognize surface technology as a way to improve their products and processes.”

Watch for more information on the progress of the Advanced Surface Research Group in future issues of *The Shot Peener*. ●

PEENSOLVER

Your Free Curve Solver Web App

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Peensolver calculates peening intensity as defined in SAE J443. It also conforms to SAE J2597. It evolved from the Curve Solver spreadsheet program developed by Dr. David Kirk that is widely used around the world. Like Dr. Kirk’s program, it generates a fitted curve through the given data points. Using the corrected arc heights from the curve, it then locates the one arc height that increases by 10% for the doubling of exposure time. This arc height is the intensity value.



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