CSEE

Center for Surface Engineering and Enhancement

EXPERTS IN SURFACE ENGINEERING

KEY CSEE ATTRIBUTES

- **Industry-Focused Surface Engineering Research**
  - Member-driven, pre-competitive projects
  - Company specific proprietary projects
  - Graduate and undergraduate level projects
- **Demonstrated Faculty Expertise/Capabilities**
  - Several surface engineering disciplines
  - In-house processing/characterization/analysis
- **Highly Engaged Members**

MEMBER BENEFITS

- **Interactive Project Experience**
  - Semi-annual meetings and "proceedings"
  - Project voting and direction setting
  - Project IP licensing priority
  - Member/faculty/student networking
- **Customized Participation and Access**
  - Multiple project, senior project and lab discounts
  - "Tiered" membership levels
  - Two-year membership option **(NEW)**

Thank you to our members!

American Axle Manufacturing
Cummins
Electronics Inc
Engineered Abrasives
Praxair Surface Tech
Rolls-Royce

"Industrial/academic research consortiums, like Purdue's Center for Surface Engineering and Enhancement, are incubators for innovation, because the industrial and academic members bring together and share their diverse, but practical, inventory of problems looking for solutions and solutions looking for problems to fix."

Steve Ferdon
Director Global Engineering Technology, Cummins Electronics & Fuel Systems Business

BS MetE '82
2021 Purdue Distinguished Engineering Alumni

PURDUE UNIVERSITY | School of Materials Engineering

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Center for Surface Engineering and Enhancement (CSEE), Shot-Peening Focus Area

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The CSEE program on shot-peening surface engineering is coordinated around three principles: 1) updating characterization and specification of shot media; 2) providing a systems level perspective on the peening process; and 3) a micro-scale perspective on the peening interaction of shot and treated surfaces. A coordinated program envisions a staggered parallel approach. Shot measurement and specification include dynamic imaging (projected 2D), data analysis, and statistical representation of shot size and shape characteristics. The systems-level perspective casts the peening process as a reduced-order flowsheet model, where the statistical representation of shot characteristics are used to optimize peening objectives. The material balance in the flowsheet is maintained via classification and replenishment, with information flow provided by on-line measurement of the shot media flow stream. The micro-scale perspective builds on a previous PhD Thesis, with additional focus on the statistical interaction between shot media and treated surfaces.
A stretch goal includes process control and multi-objective optimization using multimodal shot media (e.g., concurrent optimization of compressive stress depth profile and surface finish). Having a coordinated program of these three principles combines experimental work, characterization, and modeling to provide an integrated view, with opportunities to advance the state of manufacturing specifications, on-line measurement, and practical modeling capabilities for process and product optimization within the shot-peening community.

Project estimated start date: summer 2021