Daniel K. Carabell MS

Regional Operations Manager & Senior Staff Consultant

Mr. Daniel Carabell is the Regional Operations Manager and a Senior Staff Consultant with Engineering Systems Inc. (ESi). Mr. Carabell has over eight years of materials engineering and operations management experience using lean six sigma manufacturing principles. His technical expertise includes corrosion, environmental degradation of materials, fatigue and fracture, inspections, engineering data analysis, as well as characterization and analysis of metals, polymers and composite materials.

Mr. Carabell's investigative background includes industrial and consumer products, automotive and recreational vehicles, medical devices, plumbing components, as well as oil and gas industrial equipment. He is experienced in failure analysis, metallurgy, materials processing, and material characterization techniques including optical microscopy, scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), Fourier transform infrared spectroscopy (FTIR), and X-ray diffraction (XRD).

Prior to working at ESi, Mr. Carabell worked in the aerospace industry as a six sigma black belt. In his various roles, he specialized in improving lightweight metal casting processing, including tungsten inert gas (TIG) plug welding, heat treatment fixturing and processing, hot isostatic pressing (HIP), laser and white light dimensional scanning, as well as 3D sand printing technology.

Positions Held

Engineering Systems Inc., Ann Arbor ,MI

- Regional Operations Manager, 2025 - Present
- Senior Staff Consultant, 2023 – Present
- Materials Science and Engineering Intern, 2015

Consolidated Precision Products, Minneapolis, MN

- Operations Manager, 2021 - 2023
- CI Supervisor of Engineering, 2019 - 2021
- Product Engineer, 2017 - 2019

Magna International, Inc., Troy, MI

- Research and Development Engineering Intern, 2016

TRW Automotive, Livonia, MI

- Materials Science Intern, 2014

KUKA Systems and Robotics, Sterling Heights, MI

- Mechanical Design/Software Engineering Intern, 2013

Daniel K. Carabell
Regional Operations Manager & Senior Staff Consultant

Email: dkcarabell@engsys.com
Phone: 734-794-8329

ESi
1174 Oak Valley Dr.
Ann Arbor, MI 48108

Education

MS, Materials Science and Engineering. University of Illinois 2016

BSE, Materials Science and Engineering (Cum Laude). University of Michigan. 2015

Areas of Specialization

Failure Analysis

Metallurgy

Materials Processing and Testing

Sand Casting Lightweight Metals

Heat Treatment of Lightweight Metals

Materials Characterization

Lean Six Sigma Manufacturing

Presentations

Catastrophic Failure of a Brush Cutter Blade

D.K. Carabell and E.R. Weishaupt, presented at the International Materials Applications & Technologies ASM's Annual Meeting, IMAT, Cleveland, OH, September/October 2024

Continuing Education

- **Michigan P.E.** – Metallurgical and Materials (passed October 9, 2024)
- **Center for Creative Leadership** – CCL Boost for New Leaders 2021 - 2022

Professional Affiliations/Honors

American Society for Metals (ASM International)

- Member, 2023 – Present

Failure Analysis Society (FAS)

- Member, 2023 – Present

Material Advantage

- Member, 2013 – 2015, 2023 - Present

Michigan Material Society – University of Michigan

- Member, 2013 - 2015

Project Experience

Investigations

Industrial Equipment

- Executed failure analysis of multimillion-dollar water pump station exhibiting casing sidewall and vane material loss due to multiple corrosion mechanisms. Performed an assessment of material selection, material degradation, corrosion analysis, metallurgical evaluation, water chemistry evaluation and proposed repair of pump casing sidewall.
- Investigated wastewater sanitation plant involving bleach tanks exhibiting coating failures and corrosion of the tank structure. Failure analysis was comprised of material testing and characterization, failure mode identification, evaluation of coating application, as well as recommendations of short-term and long-term remediation.
- Performed a corrosion assessment of industrial crane equipment exposed to saltwater environment. Analyzed coating degradation, surface corrosion, and base material integrity.
- Evaluated gantry crane bolt fastener failures that resulted in catastrophic collapse of a dip tank conveyer system. Performed metallurgical evaluation and failure mode analysis of bolt fasteners, as well as an assessment of installation methodology and the impact of maintenance on the crane system.

Plumbing and Fire Suppression Systems

- Conducted root cause analysis of various water loss events, including residential and commercial plumbing fixtures, valves, and pipelines. Evaluated material selection and compatibility, materials processing and characterization, installation, maintenance, internal/external corrosion, and environmental influences on failure modes.
- Developed and executed material degradation testing for polymer plumbing components. Demonstrated the impact of various environmental and chemical interactions as it relates to material degradation.
- Performed mechanical testing on polymer plumbing components. Executed PEX pullout failures to demonstrate the relationship between the material deformation associated failure modes.
- Executed failure analysis of multiple fire suppression systems and components, including sprinkler heads, fractured pipelines, and separated couplings.

Automotive

- Performed metallurgical analysis, material characterization, and corrosion analysis on multiple vehicle systems. Evaluations included components involved in the suspension, brake system, drivetrain, engine components, chassis, seat components, tire and wheel components.
- Facilitated multidisciplinary vehicle inspections involving recreational vehicles such as ATVs and UTVs. Executed failure analysis involving fracture mechanics, fractography, and material characterization to evaluate components contributing to the accident.

Product Liability

- Executed metallurgical analysis, product testing, and design evaluation of medical devices such as walkers, rollators, and knee braces.
- Evaluated product design and performed failure analysis as well as exemplar testing of a compound miter saw to determine the failure mode involved in the accident.
- Investigated and performed failure analysis of a fractured handlebar on an electric scooter. Utilized microscopy and fractography to determine the failure mode of the material.