Daniel K. Carabell

MS, PE

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 8 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, and characterization/analysis of metals, polymers, and composites.

Mr. Carabell's investigative background includes industrial and consumer products, automotive and recreational vehicles, medical devices, plumbing components, and 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, laser and white light dimensional scanning, and 3D sand printing technology.

Education

MS, Materials Science and Engineering. University of Illinois. 2016

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

Positions Held

Engineering Systems Inc., Ann Arbor, Michigan

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

Contact Information

dkcarabell@engsys.com

(734) 794-8329

ESi Ann Arbor

1174 Oak Valley Drive
Ann Arbor, MI 48108

Areas of Specialization

- Failure Analysis
- Metallurgy
- Corrosion Analysis
- Materials Processing & Testing
- Sand Casting Lightweight Metals
- Heat Treatment of Lightweight Metals
- Materials Characterization
- Lean Six Sigma Manufacturing

Consolidated Precision Products, Minneapolis, Minnesota

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

Magna International, Inc., Troy, Michigan

- Research and Development Engineering Intern, 2016

TRW Automotive, Livonia, Michigan

- Materials Science Intern, 2014

Magna KUKA Systems and Robotics, Sterling Heights, Michigan

- Mechanical Design/Software Engineering Intern, 2013

Licensed Professional Engineer (P.E.)

- **State of Michigan -** License Number: 6201316226

Continuing Education

- **CCL Boost for New Leaders** – Center for Creative Leadership, 2022

Professional Affiliations/Honors

ASM International

- Member, 2023 – Present

Failure Analysis Society

- Member, 2023 – Present
- IMAT Session Co-Chair - Tools and Techniques (2025), Fatigue and Fracture (2024)

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 water pump station exhibiting material loss of casing sidewall and vanes due to multiple corrosion mechanisms. Assessed material selection and degradation, corrosion analysis, metallurgical/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 comprised of material testing and characterization, failure mode identification, evaluation of coating application, and recommendations of short 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 & Fire Suppression Systems

- Conducted root cause analysis of water loss events, including residential/commercial plumbing fixtures, valves, and pipelines. Evaluated material selection/compatibility, materials processing/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 related 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/corrosion analysis and material characterization on vehicle systems, including brake system, drivetrain, engine, chassis, seat, 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 factors 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 and 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.

Presentations

“Catastrophic Failure of a Brush Cutter Blade,” **D.K. Carabell** and E.R. Weishaupt, International Materials Applications & Technologies ASM’s Annual Meeting, Cleveland, OH, September/October 2024.

“Pump Casing Sidewall Failure and Internal Vane Material Degradation: A Multifaceted Corrosion Failure Explored” **D.K. Carabell**, International Materials Applications & Technologies ASM’s Annual Meeting, Detroit, MI, October 2025.

“Evaluation of Pullout Failures in Push-to-Connect PEX Connections” E.R. Weihaupt, **D.K. Carabell**, S.J. Hughes, International Materials Applications & Technologies ASM’s Annual Meeting, Detroit, MI, October 2025.