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John C. Mantas | Senior Forensic Consultant

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Professional Summary:

John is a metallurgical engineer with 10 years of experience in materials testing and failure analysis, coming from his experience at a third-party testing and engineering consulting laboratory. John has worked on projects from the transportation, industrial, commercial, and aerospace sectors. John's specialties include metallurgical testing and analysis, metallographic preparation, and metallography.

John's areas of expertise include:

- Materials: Carbon and Low Alloy Steels, Stainless Steels, Cast Iron, Aluminum Alloys, Copper and Brasses, Titanium Alloys, Superalloys
- Material testing: Visual Inspection, Hardness/Microhardness Testing, Metallography, Scanning Electron Microscopy/Energy Dispersive X-ray Spectroscopy (SEM/EDS) Analysis, In situ Metallography, Replication, and Hardness testing
- Processes: Metal Casting, Forging, Welding, Heat Treating, Plating, Powder Metallurgy, Metal Additive Manufacturing
- Industries: Foundry, Forging, Automotive, Industrial, Electric Power, Transportation, Electronics, Aerospace

Project Experience:

Element Materials Technology, New Berlin, WI
Failure Analysis of Fuel Delivery Valve Components
Two components of a fuel delivery valve, used to send pressurized jet fuel to a piston engine used for aircraft, were received for analysis, as the newly designed parts exhibited longitudinal cracking after only three hours of service. The results of the analysis revealed that the components exhibited fatigue crack propagation at the crack origin, which emanated from the machined internal bores of the components. It was found that the components exhibited poor machining, which left sharp, notch-like features, and provided a point where stresses could locally concentrate, contributing to the poor fatigue life.

Element Materials Technology, New Berlin, WI
Metallurgical Evaluation of Aluminum Alloy Die Castings
During product evaluation, it was found that the client's aluminum alloy die castings, used in automotive automatic transmissions, were failing prematurely, and significantly before a competitor product. Visual examination revealed machining deficiencies, which created sharp corners and acted as sites for stress concentration. Cross-sectional analysis revealed deleterious casting defects such as oxide skins and porosity. It was also observed that the product had a less desirable "unmodified" microstructure, which led to reduced mechanical properties and fatigue life. Consultation with the client led to an improved product through improvements in machining, the casting process, and adding microstructure modifying elements to the molten aluminum alloy.

Element Materials Technology, New Berlin, WI
In situ Metallurgical Analysis of a Steam Chest
Several locations were prepared for metallographic evaluation and hardness testing on a large, cast steel steam chest in order to determine fitness for continued service. In normal operation, the steam chest directs superheated steam to an electricity generating turbine. Although the material was slightly below the specified range for hardness, no material creep was observed. Repeat testing at the same locations one year later revealed no significant hardness or microstructural changes, ensuring the casting was fit for continued service.

Professional Experience:

Element Materials Technology, Metallurgical Laboratory Supervisor/Metallurgical Engineer, 2022 – 2024
Element Materials Technology, Metallurgical Engineering Specialist, 2014 – 2022
Center for Composites, Research Intern, 2012 – 2014

Education:

Bachelor of Science, Materials Science and Engineering, University of Wisconsin-Milwaukee, Milwaukee, WI, 2013

Affiliations:

ASM International (ASM)