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**LLOYD C. MEISSNER, P.E.**  
**SENIOR CONSULTANT**

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Lloyd Meissner is an accomplished metallurgical engineer with 39 years of experience in the fields of metallurgical and materials science. His work spans nearly three decades in the aerospace and defense industry sector at Honeywell International, in product lines ranging from lightweight torpedoes, small and large caliber munitions, smart- (millimeter and microwave) guided munitions, altimeters, air data computers and spinning mass and laser gyroscopes. These products provided a wide variety of opportunities for materials and process failure analyses ranging from beryllium to tantalum, plating and coatings, castings, forgings, laser and electron beam welding, as well as printed wiring and electronic components. His laboratory experience includes X-ray Computed Tomography (CT), Scanning Electron Microscopy X-ray Energy Dispersive Spectroscopy (SEM/EDS), Fourier Transform Infrared (FT-IR) spectroscopy and metallography. In addition to supporting the aerospace and defense market, his recent experiences include analysis of HVAC systems, corrosion of potable water and sprinkler piping, medical device analysis and consulting on a wide variety of materials issues related to insurance subrogation and litigation. Whether consulting with an industrial client to evaluate manufacturing/ processing defects, material anomalies related to raw material melting practices, poor quality plating adhesion or working with insurance subrogation or legal teams, a thorough and concise analysis is always the result.

**Areas of Specialization**

Failure Analysis and Fractography  
X-ray CT Scanning  
Materials Joining and Plating  
Corrosion  
Surface Analyses  
Medical Device Contamination

**Education**

Bachelor of Science, Michigan Technological University, Houghton, MI 1983

**Licenses/Certifications**

State of Minnesota..... P.E. License 19668

## Professional Affiliations/Honors

ASM International

Minnesota Microscopy Society

Patent, Electrode Connector for Ring Laser Gyros US 7,429,198B1, September 30, 2008

## Positions Held

Engineering Systems Inc., Plymouth, Minnesota

Senior Consultant, 2019 – Present

Crane Engineering, Plymouth, Minnesota

Metallurgical/Materials Engineer, 2011-2018

Honeywell Aerospace Electronic Systems, Minneapolis, MN

Applications Engineer/Lead Metallurgical Engineer, 1990-2011

Honeywell Defense System Division Precision Weapons Operations, Minnetonka, MN

Metallurgical Engineer, 1985-1990

Honeywell Underseas Systems Division/Defense System Division, Hopkins, MN

Metallurgical Engineer, 1983-1985

Michigan Technologist University, Houghton, MI

Research Assistant, 1982

## Presentations

“How Material Processing Affects Performance”, **Lloyd C. Meissner**, presented at ESi Smart Session, Plymouth, MN, October 2022

“Butane Stove and Cannister Failure Analysis and Investigation”, **Lloyd C. Meissner**, presented at International Materials Applications & Technologies Conference and Exposition, (IMAT), New Orleans, LA, September 2022

“Surface Hardening of Steel Components”, **Lloyd C. Meissner**, presented at Graco Contractor Equipment Division (CED), Rogers, MN, June 2022

“Butane Stove and Cannister Failure Analysis and Investigation”, **Lloyd C. Meissner/ Scott A. Sollars**, ESi hosted Webinar, March 2021

“Metallurgical Evaluations of Pipe,” **Lloyd C. Meissner**, presented at the Barings Real Estate Engineering Conference, Marco Island, FL, April 2018

“An Overview of Building Owners Services & How Metallurgical Examinations are Performed,” **Lloyd C. Meissner**, presented at the NAREIM Conference (National Association of Real Estate Investment Managers), La Jolla, CA, October 2016

“Failure Analysis Case Studies,” **Lloyd C. Meissner**, presented at GRACO – Lubrication Equipment Division (LED), Anoka, MN, May 2013

## **Selected Project Experience**

### **Butane Cannister Failure Analysis**

A small butane cannister failed while being used in a portable stove at a catering event. This resulted in a flash fire causing personal injuries. Exemplar testing was used to evaluate the overpressure devices required by industry standards in the stove and cannister. Materials testing was performed to determine the components of the stove, their respective melting temperatures, and any effects a flash fire may have caused. The investigation showed the cannister had been overheated and the release mechanism system on the stove failed to eject the butane cannister properly. This allowed overpressure to occur in the cannister and subsequent cannister failure. When the cannister failed, the released butane was ignited, causing the flash fire.

### **Firearms Plating Failure Analysis with Xray CT Scanning**

A firearms manufacturer found tiny visual defects (< 0.003” dia.) on random lots of die castings. The die casting is designed to have a mirror finish and is cast, deburred, cleaned, polished to a high luster, and then copper and nickel plated for corrosion protection. The die casting shop blamed the plating shop and vice versa. Metallography and X-Ray CT scanning was performed, confirming the defects were not originating from inherent die casting porosity and shrinkage but were in the plated copper base layer and mirrored in the nickel over plating layer. SEM/EDS identified aluminum oxide particles trapped in the copper base layer, due to trapped contaminants. These were subsequently filtered from the bath providing defect free copper plating.

### **Medical Device Contamination Analysis**

A medical device manufacturer observed contamination after a catheter testing program and requested identification of foreign materials (FOD). A variety of analytical techniques were utilized including filtration, optical microscopy, SEM/EDS, and FT-IR analyses to identify the FOD observed. In this unique case, thin flakes of transparent material were observed that were denser than water and surprisingly reacted to a permanent magnet. Subsequent analysis of the FOD revealed fluoropolymer flakes with fine embedded stainless steel particles. Wear in the device seal was the origin of the FOD.

### **Water Pipe Evaluations for Building Owners and Buyers**

A hotel investor needed detailed inspection and testing of water pipes prior to purchase of a new property. This evaluation of the domestic hot and cold water copper piping yielded favorable results regarding the useful life of pipe. In this case, although the property was >25 years old, negligible effects from corrosion, erosion or pitting were observed. This information was useful to the buyer, indicating good quality, uncompromised domestic water pipe.