



New Hampshire
MATERIALS
LABORATORY, INC.
Your Problem Solving Partner

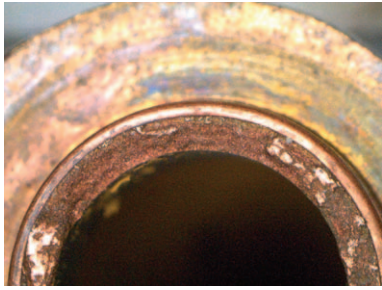
Materials Science

The structural properties and behaviors of all manufactured products, from the household weather vane to the automobile, are affected by three main factors: design geometry, fabrication methodology and material composition. Where these three points meet defines how a product will behave when in use.

At the New Hampshire Materials Laboratory (NHML), we not only provide basic Quality Assurance (QA) testing and analysis to verify material composition and performance, we also study product reactions to design geometry, manufacturing factors and material properties in order to help our clients understand why products are failing, cracking, corroding or breaking down. We look at how microscopic factors, such as chemical composition and structure, affect factors like material strength or thermal properties and overall component performance.

NHML examines the samples of materials and components that are not performing as desired to determine the source of performance issues, whether those issues stem from material selection problems, manufacturing choices or design flaws. We study microscopic factors (right image) that cause macroscopic failures (left images).





Fracture of a brass plumbing fixture by dezincification. This dealloying was caused by long term exposure to water rich in oxygen and carbon dioxide. Brasses with less than 15 percent zinc resist dezincification. Additions of small amounts of tin, arsenic, antimony and phosphorus also inhibit corrosion.

Since 1979 the staff at NHML has helped clients to analyze, deconstruct and understand the material factors that affect product safety, quality, performance and operation. The problems we have solved range across all industries and applications. Clients often come to us with a product that is cracking, breaking, corroding or otherwise failing, and they ask us to determine why in order to help them improve their product.

Using materials science, we analyze why a product is behaving the way it is, whether that means explaining why a component within a larger machine keeps failing, why a household product is corroding within half a year of manufacture or if the material composition of a product has changed as a result of manufacturing changes. We provide the “why” so that the problem can be resolved.

Testing and Analysis Available

Reverse Engineering composition analysis, mechanical property analysis, failure analysis

Quality Assurance (QA) Services testing to ASTM standards or specified customer procedures, material certification and compliance, weld process and procedure qualification

Mechanical Testing failure analysis, tension, yield strength, ultimate tensile strength and elongation, compression, bend tests, shear strength, peel and tear strength, flexural strength and modulus, insertion and withdraw force

Material and Chemical Testing hardness, material composition and analysis, contaminant identification, corrosion cause analysis and determination, heat treatment problems and verification

Equipment

Instron Universal Mechanical Testing (MTS)

Inductively-Coupled Plasma (ICP) Spectroscopy

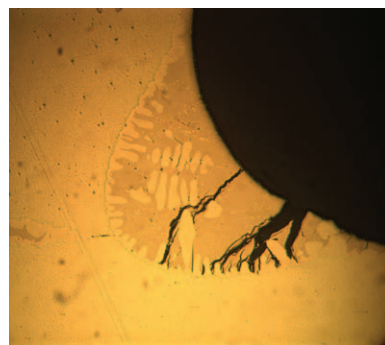
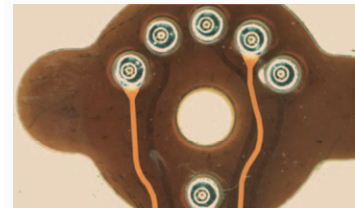
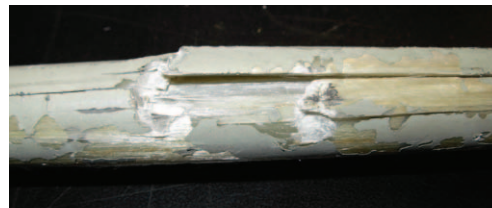
Glow Discharge Spectroscopy (GDS)

Fourier Transform Infrared (FTIR) and Micro-FTIR Spectroscopy

Gas Chromatography-Mass Spectroscopy (GC-MS)

Carbon and Sulfur Analysis

Scanning Electron Microscopy (SEM)/Energy-Dispersive Spectroscopy (EDS)



Sample cases NHML has worked with: Fracture of a glass-reinforced polymer insulator (top left), fracture of a flexible circuit lead (top right), cold cracking of a weld (bottom left), through wall corrosion of a petroleum storage tank (bottom right)

New Hampshire Materials Laboratory, Inc.
22 Interstate Drive
Somersworth, NH 03878-1209

(603) 692-4110
www.nhml.com