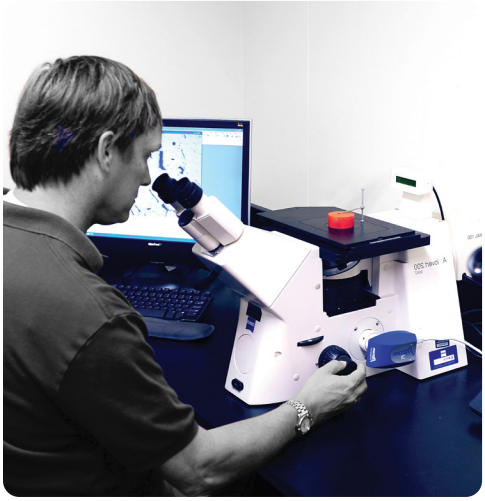
Structural Integrity Associates, Inc.®

IN-HOUSE MATERIALS LABORATORY
CAPABILITIES



SAMPLE PREPARATION

Cutting	*Diamond saw to plasma cutter*
Mounting	*Including large and odd-shaped samples*
Grinding	
Polishing	
Etching	*Including carbon steel, low alloy steel, stainless steel, nickel-based alloys, superalloys, copper and copper alloys, aluminum, titanium, etc.*

SAMPLE EXAMINATION & DOCUMENTATION

Visual	
Digital 35mm camera	*With macro capabilities*
Stereomicroscope	*0.65 to 50X*
Metallograph	*up to 1000X*
Keyence VXX Digital Microscope	*20-2500X*
SEM	*20 to 5000X and higher*

HARDNESS TESTING

Rockwell	*A, B, C, superficial scales*
Brinell	*Load Range = 500 – 3000 Kg*
Vickers-microhardness	*Load Range = 0.1 – 1 Kg*
Vickers	*Automated, Load Range = 0.01 – 50Kgf*
Portable	*UCI, Rebound, Brinell, Telebrineller*

DEPOSIT ANALYSIS

SEM–EDS/SQ with SDD detector	*Bulk and in situ element identification*
Elemental Mapping	

CHEMICAL COMPOSITION

SEM – EDS/SQ	*Bulk and in situ element identification*
PMI	*Innov-X systems Alpha Series X-ray Fluorescence Spectrometer*

BENCH TOP HEAT TREATING

Up to 1300°C (2372°F)

CRYO-CRACKING

Combines microstructural analysis and fractography to evaluate the presence of incipient creep damage

COMMONLY SUBCONTRACTED LABORATORY CAPABILITIES

Quantitative Chemical Analysis
X-ray diffraction
Mechanical Testing
Creep/Stress Rupture Testing

24/7

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FAILURE ANALYSIS

Failure is defined as any change in a component that prevents satisfactory performance of its intended function. Understanding why a component failed is important for several reasons. First, a determination of the mode of damage responsible for the failure is an essential component of any root cause analysis, although in most cases it is not sufficient for identifying the root cause of failure. Second, understanding a component failure provides essential information for preventing additional or similar failures, as well as ensuring appropriate repair or replacement decisions are made. Perhaps most importantly, an erroneous or incomplete analysis can be worse than no analysis at all, since this can prompt inappropriate responses that do not address the basic cause of failure or even increase the potential for additional failures.

CONDITION ASSESSMENT

In general terms relative to power plant and other industrial components, condition assessments are performed to understand the current condition of components that are operating in environments that can degrade material properties and suitability for service. Condition assessment can be performed using either nondestructive or destructive techniques. With regard to laboratory evaluations, condition assessments often rely on destructive testing to understand the components' metallurgical condition and to ensure that each component (or similar components which remain in service) are in an acceptable condition for continued operation. Laboratory evaluations can be performed as a standalone assessment or as part of a thorough program intended to identify trends in boiler and power plant equipment damage accumulation. Further, condition assessments can be applied to any component that has the potential for degradation in service, including boiler tubes, piping, turbine rotors, and numerous other metallic components.

NDE VERIFICATION

Nondestructive examinations performed in power plants can range from assessing waterwall tubing for hydrogen damage to measuring steam side tubing oxide thicknesses for condition assessment to examining high energy piping long seam and girth welds for service-related damage. Sometimes, though, NDE results can be challenging to interpret. Removing a metallurgical sample from the area in question for destructive analysis can be beneficial in assessing the NDE results.

ON-SITE ACTIVITIES

SI can bring the lab to you – our Materials team can perform on-site metallurgical replication, hardness testing, and compositional analyses, and can provide engineering support for evaluation of failed components. We can also provide on-site documentation and technical guidance related to sample selection and preservation. Prior to destructive testing, we can provide detailed testing protocols aimed at identifying damage mechanisms and causation.

TECHNIQUES AND EQUIPMENT

The need for material property evaluations can result from questions about materials used in new construction, suspected material degradation due to prolonged service, or, as part of an investigation into the cause of a failure event. For any situation involving material property characterization, Structural Integrity has an experienced group of materials specialists, and a full-service metallurgical testing laboratory that can perform any number of chemical, mechanical, or specially designed tests to address specific circumstances or in-service degradation.