

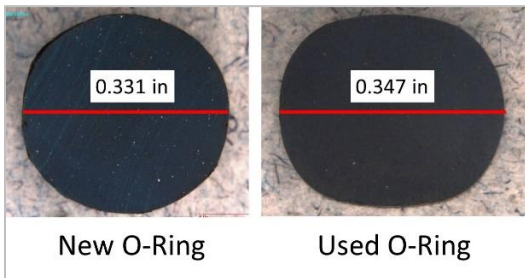
Solutions to Unique Challenges

Imperia Engineering Partners is a premier provider of engineering and technical services to existing nuclear facilities. It has been a trusted engineering and consulting partner for over 30 years. The Materials Engineering Laboratory is experienced in the characterization, selection, and testing of polymer materials.

Failure Analysis

The evaluation of a failure will usually consist of:

- Visual and microscopic evaluation of the polymeric material. Information such as location of the failure, characteristic of the failure, are important to understand the root cause and prevent re-occurrence.



O-Rings Examinations and Measurements

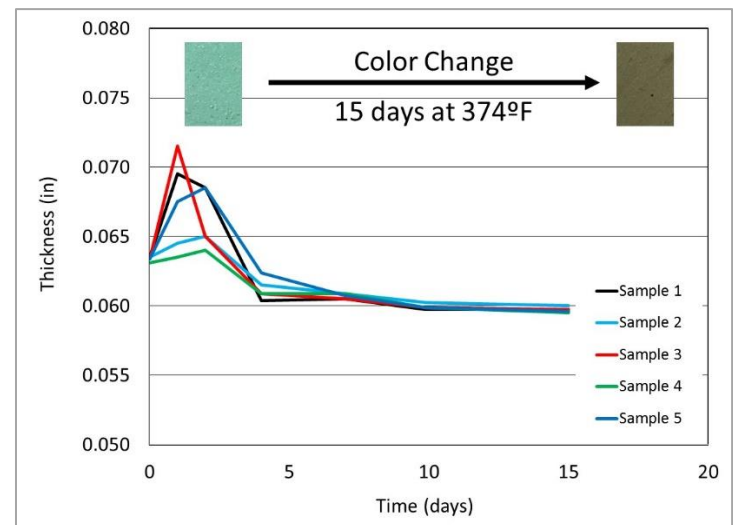
- Chemical characterization to determine if:
 - The right material was used.
 - A contaminant, or an impurity is present.
 - The chemistry of the material has changed.
 - Mechanical and thermal characterization. Could the material used sustain the environmental conditions it was exposed to during use?

Our Goal: Find the root cause and provide a solution to avoid future failures.

Material Selection

Imperia Materials Engineering Laboratory can help select the right polymeric material.

Temperature of use, forces applied to the material, chemical exposure, all those parameters are considered to design a test that will simulate the life cycle of the material.



Gasket Color and Thickness Variation due to Exposure to Temperature (374°F)

Life Cycle Extension

Imperia Materials Engineering Laboratory can evaluate polymeric parts removed from service to determine if the replacement cycle of the parts can be safely extended. This service has saved thousands of dollars in down time to our nuclear plant customer.

Training

We can tailor training on polymer materials to specific needs. Potential subjects: Polymer Fundamentals, Polymer Selection, Polymer Degradation Aging.

Materials Engineering Laboratory

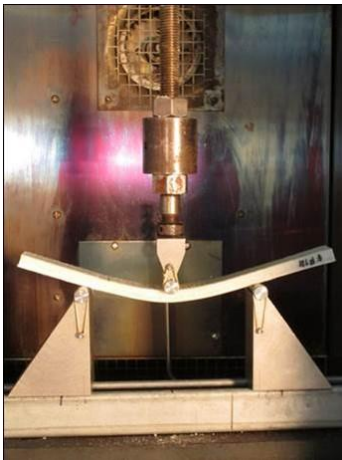
Polymeric Materials

Equipment

- ✓ Microscopes with Imaging
- ✓ Fourier Transform Infrared with Microscope
- ✓ Scanning Electron Microscope\Energy Dispersive Spectrometer
- ✓ Differential Scanning Calorimeter
- ✓ Fully Equipped Chemical Laboratory
- ✓ Mechanical Testing –Tension, Compression, Peels, Fatigue and more.
- ✓ Machine Shop (customized test)

Selected Projects for the Nuclear Industry

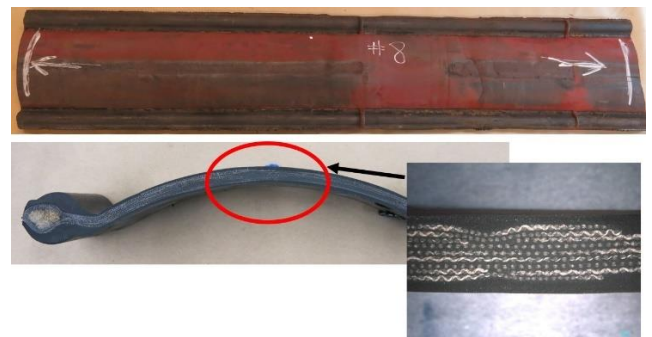
- ✓ O-Ring Evaluations – Reactor Feed Pump, EDG, level Sensors
- ✓ EDG Cooling Jacket Gasket Failure Analysis
- ✓ Main Generator Bushing Gasket
- ✓ Cure-in-Place Pipe, Carbon Fiber Material Evaluation
- ✓ Lifetime Extension of Main Condenser Boot Seals



Flexural Testing of Laminated Material



Life Cycle Testing Experiment



Condenser Boot Seal and Cross Section at Joint Location



About Imperia

Imperia Engineering Partners (formerly Altran US Corp.) has been a trusted, high-tech engineering and consulting partner of businesses in the Energy industry for over 30 years. Our areas of expertise include fossil and renewable power generation; power delivery; nuclear consulting; and industrial and facilities engineering.

The Materials Engineering Laboratory's expertise in polymer and chemistry, materials processing, metallurgy, coating and linings, instrumentation & control, mechanical engineering, electrical engineering and failure analysis.

Contact: sales@imperiaep.com
Materials Engineering Laboratory
113 Cedar Street, Suite 6
Milford, MA 01757
Tel.: (855) 425-8726

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