Metallurgical Replication

IN-SITU EVALUATION

MINIMIZE OPERATIONAL RISKS AND OPTIMIZE ASSETS

WHAT IS IT?

Metallurgical Replication is a nondestructive technique that is performed on the surface of a component in-situ to evaluate the microstructure and other surface features in lieu of physically removing material for laboratory evaluations. Replication is a critical method for assessment of in-service equipment, as some damage mechanisms are time-dependent, and evaluating the microstructure can detect critical defects or degradation of equipment before catastrophic failures occur.

An Acuren technician obtaining a replica

THE PROCESS

Acuren follows the guidelines in ASTM A1351 and ASTM E407 in our detailed procedure for preparing the metal surfaces and carrying out the replication process. In-situ metallographic replication involves the following general steps:

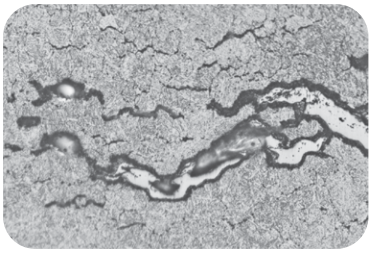
- Engineering and inspection knowledge used to identify locations for replication
- Contaminants and outer surface layer (oxide, carburized, decarburized, or other scales) removed by grinding
- Polish surface to mirror like finish
- Chemically etch the surface to reveal the material microstructure
- Application and removal of acetate tape to "transfer" the microstructure to the tape, like a "fingerprint"
- Final preparation of tape or "replica"
- Engineering interpretation of replica in optical microscope using field microscope or laboratory setting

METALLURGICAL REPLICATION APPLICATIONS

- Part of fire damage assessment process
- Detect high temperature service damage
- Characterize the level/extent of creep for life assessment
- Measure grain size
- Reveal morphology of cracks, flaws and other microstructural features
- Reveal usage of incorrect filler metals in welding processes
- Determine if incorrect heat-treatments utilized
- Provide information on thermal history of components

A HIGHER LEVEL OF RELIABILITY®

Fast & Cost Effective



Creep Damage (Macrocracking)

WHY ACUREN?

- Acuren engineers and inspectors are able to facilitate identifying the locations on your equipment where replication would be most beneficial
- Acuren can develop specialized etching processes developed for an array of materials and different damage mechanisms
- There is an art to performing metal replication, and at Acuren this is performed by only competent technicians, qualified to Acuren internal procedures
- Technicians deliver rapid, reliable, replication services to help ensure reliability of our customer's components to help eliminate costly failures and downtime
- Replicas assessed by highly trained professional engineers who understand materials science and damage mechanisms
- Acuren provides responsive turnaround times and are able to meet customer's required operational and production schedules
- If necessary, Acuren can provide follow-up materials engineering or materials testing and lab services to corroborate replication findings

ACUREN

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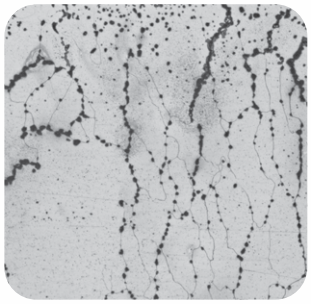
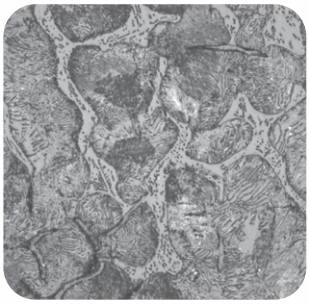
Southeast	919.875.8240
Northeast	724.228.2155

Pacific	604.275.3800
Western	780.440.2131
Central	905.825.8595
Atlantic	709.753.2100

VIEW OUR BROCHURES



Creep damage in 800H Alloy



Evaluation of Cast Iron Microstructure

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BEYOND INSPECTION