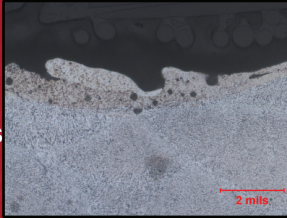


## Additive Manufacturing Analyses

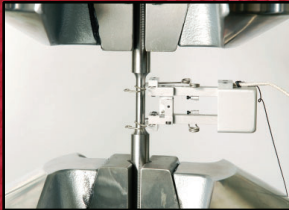
**Powder Analysis** - We provide chemical analysis (ICP-MS, ICP-AES), percent crystallinity, particle size (Microtrac), and morphology (XRD, SEM & optical) to fully characterize your starting powder.

**Metallography** - Our team employs many advanced mounting, polishing and examination techniques to thoroughly evaluate the most advanced coatings.



**Tensile Testing** - IMR provides coating adhesion testing of samples, both as coupons or on part geometries.

**Fatigue Testing** - We provide shear strength and shear fatigue testing of samples from test bars to actual coated parts.



**Rotating Beam Fatigue Testing** - A valuable tool for evaluating coatings under reverse bending conditions

**Density Testing** - An important test IMR performs to determine the compactness of a material.

**Compression Testing** - An essential test that allows IMR to determine how much force a sample can handle.

**Failure Analysis** - Our experienced team of metallurgists and material scientists possesses the specialized knowledge to determine why coatings fail.



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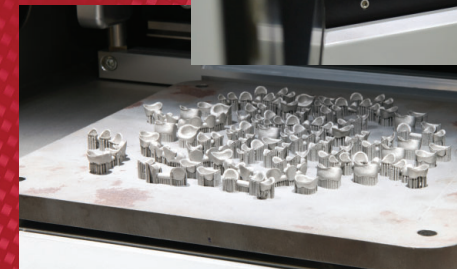
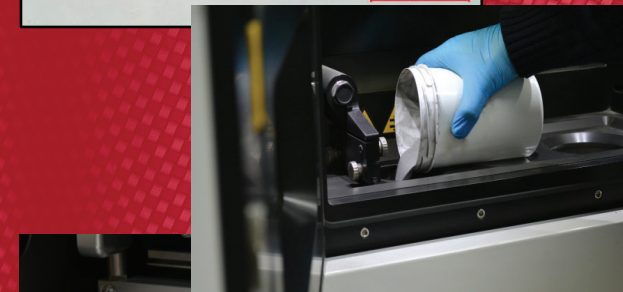
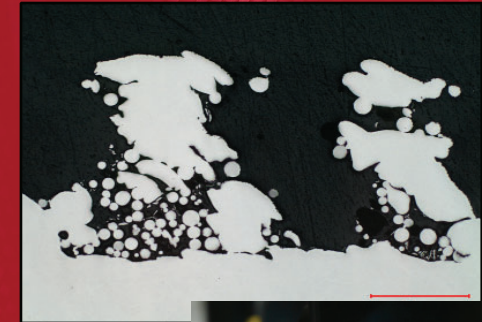
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WRIGHT**  
IMR TEST LABS

**Analytical Services for  
Additive Manufacturing**

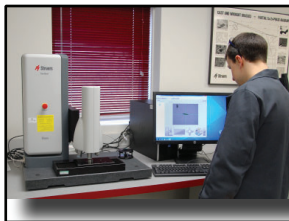
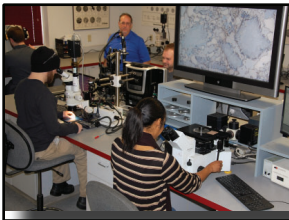


[www.imrtest.com](http://www.imrtest.com)



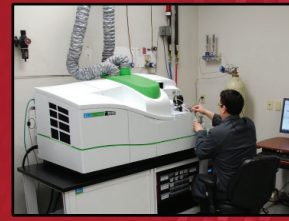
## Metallurgical Evaluations

- Alpha Case
- Aggressive Machining Evaluations
- Braze Analysis
- Case Depth
- Certified Weld Inspections
- Coatings Analysis
- Decarburization
- Failure Analysis
- Fractography/Fracture Mechanics
- Grain Size
- Image Analysis
- Inclusion Rating
- Intergranular Attack
- Intergranular Oxidation
- Macroetch/Microetch
- Metallography/Materialography
- Microhardness (Knoop, Vickers, MacroVickers)
- Microstructure
- Orientation in Microstructure
- Particle Analysis (Distribution, ID, Size)
- Phase Volume Determination
- Quantitative Image Analysis
- Root Cause Evaluation
- SEM Analysis
- Welder Qualification



## Chemical Analysis

- Alloy Chemistry/Verification
- Apparent Density
- Ash Content
- Carney Flow Rate
- C, H, O, N, S
- Chemical Resistance
- Cleanliness Testing
- Coating Weight
- Contaminant/Corrodent Analysis
- Density
- DSC Analysis (Melting Point, Glass Transition, % Crystallinity, Degree of Cure, Purity)
- Filler Content Analysis
- FTIR Analysis
- Hall Flow Rate
- Halogen Analysis (IC)
- Heavy Metal Impurities
- Hexavalent Chromium
- ICP-AES Analysis
- ICP-MS Trace Element Analysis
- Ion Chromatography (IC)
- Material Certification
- Mercury Analysis
- Metallic Material Verification/ID
- OES Analysis
- Particle Size Analysis
- Percent Crystallinity
- Phase Identification
- Positive Material ID (On-site PMI available)
- Powder Diffraction
- Precious Metal Assay
- RoHS Testing
- SEM/EDX
- Sieve Analysis
- Tap Density
- Trace Element Analysis
- Unknown Material ID
- X-Ray Diffraction (XRD)
- XRF Chemistry



## Mechanical Testing

- Bend Testing (3 Point, 4 Point)
- Bond Strength Testing
- Charpy Impact Testing (-320°F to 450°F)
- Coefficient of Thermal Expansion by TMA
- Composite Testing (FRC, CMC)
- Creep & Stress Rupture
- Fatigue Testing (Axial, Low Cycle, High Cycle, Rotating Beam, Coating Shear)
- Flexural Properties (Modulus, Strength, Stress-Strain Response)
- Fracture Mechanics
- Hardness (Rockwell, Brinell)
- Heat Aging
- Indentation Toughness
- Impact Testing (Charpy, IZOD)
- Lap Shear Testing
- Open Hole Tension/Compression
- Shear Properties
- Slow Strain Rate
- Taber Abrasion/Wear Resistance
- Tensile Testing - Metals (to 2000°F)
- Torsional/Axial Fatigue (200 lb)

