



FACTS

Alcoa Howmet's Technical Services, located in Whitehall, Michigan, conducts analyses of nickel and cobalt superalloys, titanium, aluminum and ferrous alloys, high-temperature coatings, weld wire, ceramics, plastics, waxes, and other process materials related to the investment casting industry. It specializes in rapid turn times for production release of raw materials and alloys, as well as certification of products at very competitive rates. Testing services are linked electronically to sample preparation and testing procedures such that traceability is maintained throughout the testing process. The laboratories are ISO9001:2000 (AS9100) certified and accredited by Nadcap and A2LA. Airbus, Bell Helicopter, Boeing, General Electric, Rocketdyne, Rolls-Royce and others have approved the laboratory for material testing.

CHEMICAL TESTING

- Wet and spectrographic analysis of major, minor and trace elements
- Carbon, sulfur, oxygen, nitrogen, hydrogen
- U & Th in zirconia and zircon
- Semi-quantitative XRD, phase and compound identification (e.g., percent of cristobalite)
- Trace element and surface contamination
- Vacuum button remelting sample prep

MECHANICAL TESTING & HEAT TREAT

- Tensile testing (to 2100°F/1148°C)
- Creep and stress rupture to (2100°F/1148°C)
- Rockwell and Brinell hardness testing
- Vacuum and argon heat treat (to 2475°F/1357°C)

PHYSICAL TESTING

Ceramic Characterization

- Sieve and particle size analysis (to 0.1 micron)
- Thermal conductivity (to 2550°F/1398°C)
- Thermal expansion (to 2900°F/1593°C)
- MOR/MOE (to 2800°F/1537°C)
- Creep and slump (to 2850°F/1565°C)
- Permeability (to 2800°F/1537°C)
- Alloy/ceramic melting interactions (wetting)
- Density and porosity

Pattern Material Testing

- Viscosity
- Ash, loss on ignition
- Softening point
- Penetration
- Melt point
- Modulus of rupture

Thermal Analysis

- DSC, DTA & TGA

CONTACT INFORMATION:

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ELECTRON OPTICS

Scanning Electron Microscopy

- Large 12 in (30.48 cm) specimen chamber with an 8 in (20.32 cm) stage (magnification up to 100,000x with resolution of 2-4 nm)
- Energy dispersive spectroscopy (EDS)
- Detection modes: secondary electron, backscatter, Robinson backscatter & cathodoluminescence
- Qualitative analysis (C to U), X-ray mapping

- Fractography, surface contamination, failure analysis and defect characterization

Electron Microprobe Analysis

- A 3-axis, automated stage with working area of 40 mm (1.6 in) x 40 mm (1.6 in)
- Wavelength dispersive spectroscopy
- Quantitative analysis (Na to U), X-ray mapping and line scan analysis
- Chemical certification of metallic coatings
- Particle and phase identification

METALLOGRAPHY

- Metallic and ceramic sample preparation, mounts up to 2 in x 4 in (5.08 cm x 10.16 cm)
- Precision cutting and grinding
- Microscopic examinations for measurement of features to 0.0001 in (0.0254 mm)
- Digital and Polaroid photography of microstructure
- Microhardness (Vickers & Knoop)
- Quantitative image analysis (grain size, percentage of porosity and percentage of solutioning)
- Process approval, failure analysis, problem solving and consulting services



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