

## Coating and Additive Manufacturing Services Huntersville, NC, U.S.A.

**All under one roof.** Benefit from our expert thermal spray coating and additive manufacturing services, whether for prototyping or production. We can restore existing parts and build to your prints. With our renowned coating services, we can reduce your operating costs by improving the life and efficiency of your components and systems. Our additive manufacturing services draws on a wide-range of build materials and capabilities to produce complex components that are less costly and with better structural integrity than conventional construction. And, of course, we are with you every step of the way!

### Thermal Spray

#### Coating Specialties

- Atmospheric Plasma Spray
- HVOF (Gas and Liquid Fuel)
- Electric Arc Wire Spray
- Automated Thermal Spray Booths:
  - Overhead- and front-loading sliding doors
  - Track-mounted 6-axis robotics
  - Tilting / indexing turntables
  - Turntable with 12-individually rotating satellite stations for batch processing of smaller parts
  - Lathe mount

#### Part Handling Capacity

##### Turntables:

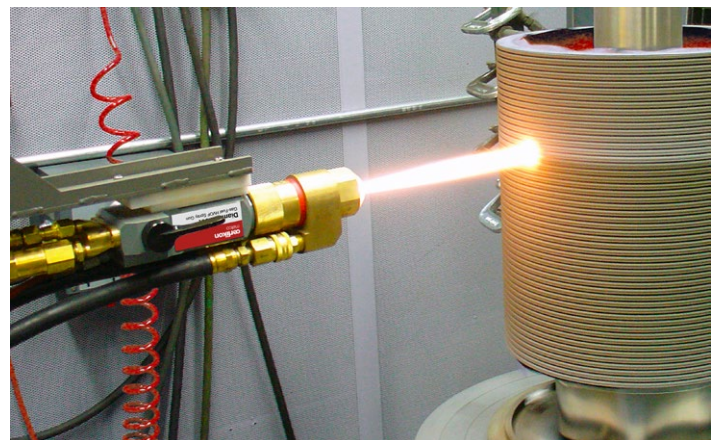
- Weight up to 15 000 lb (6800 kg)
- Length up to 84 in (2134 mm)
- Diameter up to 68 in (1724 mm)
- Inner diameter from 2 in to 68 in (50.8 mm to 1724 mm)

##### Shaft Spraying (Lathe Mount):

- Length up to 198 in (5029 mm)
- Diameter up to 39 in (991 mm)

##### Overhead Crane:

- Weight up to 15000 lb (6800 kg)



### Additive Manufacturing

- 7 metal printers (EOS) with build volume of 250 mm x 250 mm x 325 mm, mid-size frame, single laser
- 4 metal printers (Concept Laser) with build volume of 245 mm x 245 mm x 245 mm, mid-size frame, dual laser
- 4 metal printers (EOS) with build volume of 400 mm x 400 mm x 400 mm, large-size frame, single laser
- AM printers equipped with de-powdering capabilities
- Digital file management software including Solidworks, Magics (slice and simulation) and printing machine build processors

### Certified Quality Management Systems

- ISO 9001
- AS 9100
- ISO 14001 (planned 2023)
- ISO 45001 (planned 2023)
- Nadcap (certified laboratory: planned 2023)

## Grinding and Machining<sup>b</sup>

### O.D. Cylindrical Grinding

- Grind diameter up to 30 in (762 mm)
- Length up to 160 in (4062 mm) between centers
- Weight up to 6000 lb (2700 kg)
- Taper grinding capable

### CNC Cylindrical Roll Grinding

- Grind diameter from 1.0 to 24 in (25 to 610 mm)
- Length up to 120 in (3050 mm) between centers
- Weight up to 6000 lb (2700 kg)
- Taper grinding capable

### I.D. Grinding

- Swing diameter up to 30 in (760 mm)
- Grind diameter from 0.75 to 25 in (19 to 635 mm)
- Length up to 18 in (457 mm)
- Weight up to 2000 lb (900 kg)

### CNC Surface Grinding

- Part dimensions up to 18 in W x 30 in L x 8 in H (457 mm W x 762 mm L x 203 mm H)

### Manual and CNC Milling

- X-axis traverse up to 40 in (1016 mm)
- Y-axis traverse up to 20 in (508 mm)
- Z-axis traverse up to 24 in (610 mm)
- Weight up to 1750 lb (794 kg)
- 3-axis CNC mill with 40 in x 20 in (1016 mm x 2032 mm) table, holds up to 24 tools with side-load carousel
- CNC mill with 31.5 in (800 mm) table [extendable to 35.4 in (900 mm)] for parts up to 31.5 in (800 mm) height; holds up to 42 tools up to 11.8 in (300 mm) long

### Manual and CNC Turning

- Turn diameter up to 16 in (406 mm)
- Turn length up to 29 in (736 mm)
- Live tooling capable

### CNC Shaft Machining Center:

- Turn diameter up to 22 in (559 mm)
- Turn length up to 120 in (3048 mm)
- Live tooling capable

### Superfinishing

- Film polishers: 4 in (102 mm) and 2 in (51 mm)
- Films: 15, 9, 6 and 3 µm

### Keyseat Machining

- Key cut width from 0.063 to 1.25 in (1.6 to 31.75 mm)
- Stroke up to 9 in (229 mm)
- Bore diameter down to 0.75 in (19 mm)

### Overhead Crane (Machining Area)

- Weight up to 10,000 lb (4536 kg)

<sup>b</sup> All O.D. and I.D. limits depend on the total length of the part

Information is subject to change without prior notice.

## Additional Capabilities

### Processing

- Grit and bead blasting for small and large parts
- EDM wire cutting

### Heat Treatment Furnaces:

- High vacuum furnace 18 x 18 x 24 in (457 x 457 x 609 mm), ultimate vacuum: 10-4 mbar, max pressure: 12 bar, max temperature: 2372 °F (1300 °C), argon colling for stress relief, solutioning, aging, annealing (Al alloys excluded)
- HIP furnace 47.24 in (1200 mm) height x 14.76 in (375 mm) diameter, max pressure: 2070 bar, max temperature: 2552 °F (1400 °C), argon cooling (Al alloys excluded)
- Atmospheric furnace 15.7 x 15.7 x 23.6 in (400 x 400 x 600 mm), max temperature 1200 °F (650 °C), air cooling, for stress relief and aging of Al alloys

### Powder Handling:

- 7.5 ft<sup>3</sup> (0.2 m<sup>3</sup>) blender for mixing AM production powder batches
- 2 blenders for Ni and SS powders or Ti and Al powders
- Screen and sieving for reactive and non-reactive powders
- Explosion proof dust collection

### In-House Metallography and Quality Testing

- High-precision CMM dimensional inspection / verification
- Blue light optical scanning and mapping
- 250 kN load frame tensile testing at up to 1830 °F (1000 °C)
- Density measurement (for printed parts)
- State-of-the-art metallography laboratory including:
  - Sample preparation, grinding, polishing, mounting
  - Scanning electron microscope for microstructure imaging, fracture surfaces, powder morphology and qualitative chemical analysis
  - Energy dispersive spectroscopy (EDS) for chemical microstructure analysis of powder and printed materials
  - Electron backscatter diffraction (EBSD) for grain orientation and size measurements and phase identity
  - Automated microhardness mapping in two dimensions
  - Stereoscope with ability to quantify surface roughness
- In-house powder characterization including:
  - Powder flow (Hall, Carney, FT4, angle of repose)
  - Apparent, Archimedes, skeletal, tap density analysis
  - O<sub>2</sub>, N<sub>2</sub>, H<sub>2</sub>, C and S analysis
  - Sieve and laser backscatter particle size analysis
  - Morphology analysis

## Same-Day Service

- Premium service availability for thermal spray

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metco

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