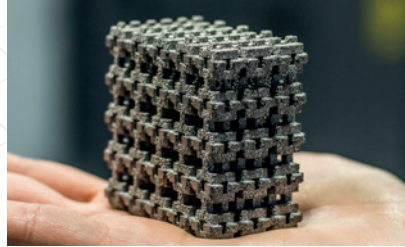




ECM
TECHNOLOGIES

VACUUM FURNACES POST ADDITIVE MANUFACTURING



HEAT TREATMENT FOR MATERIALS PRODUCED BY 3D PRINTING

In 3D printing, metal parts are made by successive layers of metal powders.

The rapid cooling following the laser step causes variations in the parts' microstructure, phase changes and expansion and receding phenomena. **These constraints are inherent in rapid manufacturing.**

In order to improve the material's **cohesion and obtain good mechanical properties**, it is necessary

to first carry out a stress relieving heat treatment on the metal parts to remove residual constraints and disperse the tension accumulated during manufacturing.

To increase the **strength and durability** of these parts still porous and often with a complex geometry, a complementary heat treatment is necessary to ensure the phases of solution treatment and aging.

HORIZONTAL VACUUM FURNACES

TURQUOISE RANGE



VACUUM HEAT TREATMENT: A QUALITY AND RELIABILITY GUARANTEE

Heat treatments carried out in the **ECM Technologies' Turquoise vacuum furnaces** are specifically tailored to alloys prone to oxidation: Nickel, Titanium, Cobalt-Chrome-Molybdenum as well as Tungsten, all require, to be treated under primary or secondary vacuum.

The TURQUOISE furnace offers:

- Low temperature treatment for the stress-relieving: necessary phase to relieve constraints and stress due to additive manufacturing,

- Treatment under controlled atmosphere for alloy's microstructure in order to optimize the parts' **mechanical strength**,

- Accelerated cooling: controlled cooling process **reducing cycle time**,

- Possibility to **heat up to 1,600 °C** for specific applications.

APPLICATIONS



AERONAUTICS



AUTOMOTIVE



MEDICAL

AN INNOVATIVE SOLUTION DEDICATED TO HIGH-TECH SECTORS

The ECM Technologies' furnace meets advanced sectors as Medical, Automotive and Aeronautics production requirements:

- Vacuum Heat treatments are specifically **tailored to alloys prone to oxidation**,
- Our resistor's patented design **assures a perfect homogeneity**,
- The molybdenum heating core and metal insulation, **certify a clean treatment** avoiding any risk of pollution.
- An **optimum atmosphere** guarantees by the use a dew point probe and a spectrometer of mass (optional).
- An accelerated neutral gas cooling disposal allowing to **increase productivity** (optional).



Certified Standards
AMS 2750
AMS 2769

Work Volume
250x250x500 mm (WxHxD)

ALLOYS

- Titanium, nickel
- Cobalt, Chromium, Molybdenum
- Tungsten
- Stainless steel...

PROCESS

- Stress relieving
- Annealing
- Ageing
- Solution treatment

TECHNOLOGIES

- Primary vacuum
- Secondary vacuum
- Pressure control
- Fast & controlled cooling
- Metallic thermal

TEMPERATURES

600 °C

800 °C - 900 °C

1 600 °C

AVAILABLE FUNCTIONS

Thermal

- Molybdenum
- Graphite
- Tungsten

Vacuum

- Primary
 - Vane pump
 - Dry pump
 - Roots pump
- Secondary
 - Diffusion pump
 - Turbo pump
 - Cryogenic pump

Gas

- Nitrogen
- Argon
- Hydrogen

Atmosphere management

- Rotameter
- Mass flow
- Pressure regulation

Standards

- AMS 2750
- AMSH 81200
- AMS 28013
- ATEX

Cooling

- Forced convection
- Quenching
 - < 1.45 bar
 - 5 bar
 - 10 bar
- Speed variation

Supervision

- Process piloting
 - Production tracking
 - Process data backup

Ergonomics

- Loading platform
- Handling tool