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CARBOLITE ELTRA QATM Retsch MICROTRAC ERWEKA



SPACE AND DEFENCE

APPLICATION SOLUTIONS FOR METALS & ALLOYS,
CERAMICS & C/C COMPOSITES, PROPULSIVE & PROPELLANTS

ENABLING PROGRESS

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DISCOVER MORE

METALS & ALLOYS

CERAMICS & C/C COMPOSITES

PROPULSIVE & PROPELLANTS

PARTICLE CHARACTERIZATION

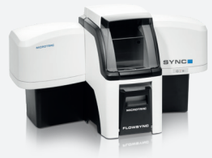
MICROTRAC

- Particle **size, shape, surface area**, and density analysis to characterize aerospace and **military-grade metal powders.**

Example of Standard Methods: ASTM B922, ASTM B923, ISO 9277, ISO 12154.

- **Particle size** analysis to ensure reliable **sintering behaviour** and final microstructure.
- Porosity and surface area analysis to ensure strength, heat resistance, and protection.

- Particle size and shape analysis, including precise **HMX characterization**, to ensure burn rate control, stability and compliance with defence standards (MIL-DTL-45444A).
- **BET surface area** analysis to predict **ignition speed** and binder needs for safe, reliable propellants.



ELEMENTAL ANALYSIS

ELTRA

- **Elemental analysis** of steel, alloys, and titanium **to prevent embrittlement, cracking**, and loss of strength in critical defence metals.

- **Carbon and oxygen determination** to provide quality control by verifying **resin content**, oxidation levels, and reliability of aerospace and defence materials.

- Thermogravimetric analysis (TGA) to verify **thermal stability**, binder content and moisture levels of energetic materials.
- **Carbon and nitrogen analysis** to guarantee consistent **energy, stability and traceability** of gunpowder and propellants.



HEAT TREATMENT

CARBOLITE

- **Heat treatment** to provide metals with the precise strength and durability required for demanding applications such as **jet engine turbine blades**.

Example of Standard Methods: AMS2750 (NADCAP).

- **High-temperature thermal processing** to produce **ceramics and composites** with strength and heat resistance for rocket nozzles, missile nose cones, and hypersonic surfaces.

- **Controlled-atmosphere and high-temperature furnaces** to simulate storage, service and **thermal stability** of energetic materials for defence compliance.
- Ashing furnaces to determine binder or residue content in propellant formulations for purity, safety and performance checks.



MATERIALOGRAPHY & HARDNESS TESTING

QATM

- Sample preparation and **hardness testing** to ensure **strength**, **durability** and compliance with defence standards.

- Hardness testing to verify **strength, wear resistance, and ballistic performance**, ensuring compliance with strict military standards.

- **Metallographic preparation** and hardness **testing of propellants**, binders, and casings to assess microstructure, defects and mechanical integrity under pressure and heat.
- Weld and **coating inspection** of containment vessels to ensure structural reliability and compliance with military standards.



MILLING & SIEVING

Retsch

- High-energy **ball mills** to enable **mechanical alloying** and create advanced alloys and **nanostructured materials**.

- **Efficient milling** to provide reliable particle sizes for sintering, alloying, and material testing.

- Sieve analysis to control **aluminum powder size** in rocket propellants for consistent burn performance and specification compliance.



FROM POWDERS TO PERFORMANCE IN DEFENCE

RAW MATERIALS & POWDERS
PARTICLE SIZE & SHAPE, SURFACE AREA
MILLING, HOMOGENIZING, SIEVING

CHEMICAL COMPOSITION
CS & ONH ELEMENTAL ANALYSIS, THERMAL STABILITY (TGA)

THERMAL PROCESSING & TREATMENT
HEAT TREATMENT, CURING, GRAPHITIZATION, THERMAL STABILITY

STRUCTURE & MECHANICAL PROPERTIES
METALLOGRAPHY, HARDNESS, COATINGS, WELD ANALYSIS

FINAL PRODUCT TEST
BET SURFACE AREA, POROSITY, DENSITY

FINAL DEFENCE APPLICATIONS
Armor Plate, Turbine Blade, Rocket Propellant Grain, Lunar Dust Analysis, Vehicle/Drone Part

ENABLING PROGRESS



1300
EMPLOYEES

300
MIO. € SALES

22
SALES OFFICES

11
MANUFACTURING SITES

VERDER

GLOBAL REACH, LOCAL EXPERTISE

HEAT TREATMENT

ELEMENTAL ANALYSIS

MATERIALOGRAPHY & HARDNESS TESTING

MILLING & SIEVING

PARTICLE CHARACTERIZATION

PHARMACEUTICAL TESTING

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