REM® Surface Engineering

# Surface Finishing Solutions for Addititve Manufacturing

## Extreme ISF® Process

REM's Extreme ISF® Process is a suite of chemical and chemical-mechanical surface material removal processes suitable for use on a wide variety of metal additively manufactured components. REM's Chemical Polishing (CP) process is a controlled chemical dissolution technology, optimized to controllably alter surface texture with a high degree of precision, and REM's Chemical-Mechanical Polishing (CMP) process is a combinatory process using chemical surface activation and gentle mechanical rubbing to planarize a surface. REM's CP and CMP processes can be used individually and in combination.

## Technology Applications

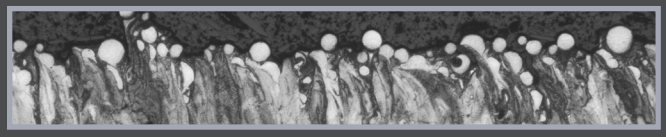
- Internal Channels
- Gyroid & Lattice Structures
- Fluid Flow Applications
- Cleanliness Critical Applications
- Fatigue Critical Applications
- RF Applications
- Casting Replacements
- Support Structure Removal
- High & Low Volume Applications

## Technology Benefits

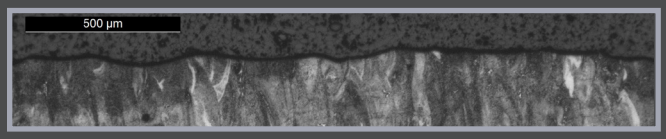
- Increases Dynamic Fatigue Life
- Increases Corrosion Resistance
- Reduces Pressure Drop
- Facilitates Effective Crack Inspection (FPI/MPI)
- Improves RF Performance
- Improves Cleanliness
- Reduces Particle Shedding (SAE AS4059 Class 5 or better)
- Capable of Controllably Reducing Wall Thickness
- Capable of Removing Oxide Layers
- Capable of Controllably Increasing Orifice Size
- Can Maintain or Reduce Texture-based Surface Area

### PBF-EB/Ti-6Al-4V Cross Sections

BEFORE



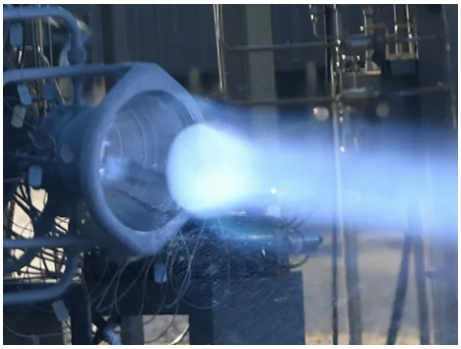
AFTER



## Alloy & Build Style Experience

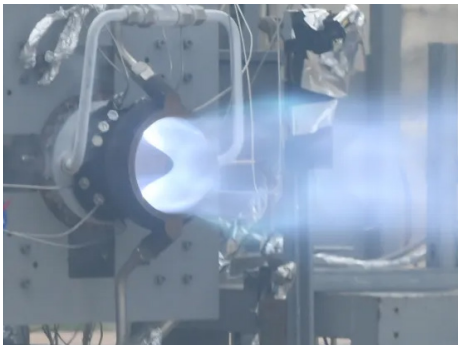
- Titanium Alloys
- Superalloys
- Copper Alloys
- Aluminum Alloys
- Stainless Steel Alloys
- Nickel Alloys
- Steel Alloys
- Refractory Alloys
- Bulk Metallic Glass Alloys
- Laser Powder Bed Fusion (PBF-LB)
- Laser Powder Directed Energy Deposition (DED-LB/M/p)
- Electron Beam Melting (PBF-EB)
- Binder Jetting (BJT-MSt/M)
- Laser Wire Directed Energy Deposition (DED-LB/M/w)

**LLAMA Hot Fire**



**RAMFIRE Hot Fire**

**RDRE Hot Fire**



Hot Fire Images courtesy of NASA.

**Successful NASA MSFC Hot Fires featuring REM processed components**

## Working With REM

REM is a technology solution provider. We will work with you to define and validate the optimal processing approach for your application(s). REM can then support your production needs via outsourced processing at a REM facility or via a process installation at your facility.

Approved Supplier | NASA Jet Propulsion Laboratory California Institute of Technology

MTU Aero Engines

Team Member | RAMPT NASA Rapid Analysis & Manufacturing Propulsion Technology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**REM quality management system is certified to ISO 9001:2015 and AS9100:2016 Rev D**