

Kinetic Metallization

Introduction

About Inovati

1989 - 1992 Las Cruces, NM

1993 - 1999 Menlo Park, CA

1999 - Present Santa Barbara, CA



Kinetic Metallization

- Small Footprint
- Low Noise
- Low consumable usage
 - Compared to competition
- Wide usage US Military



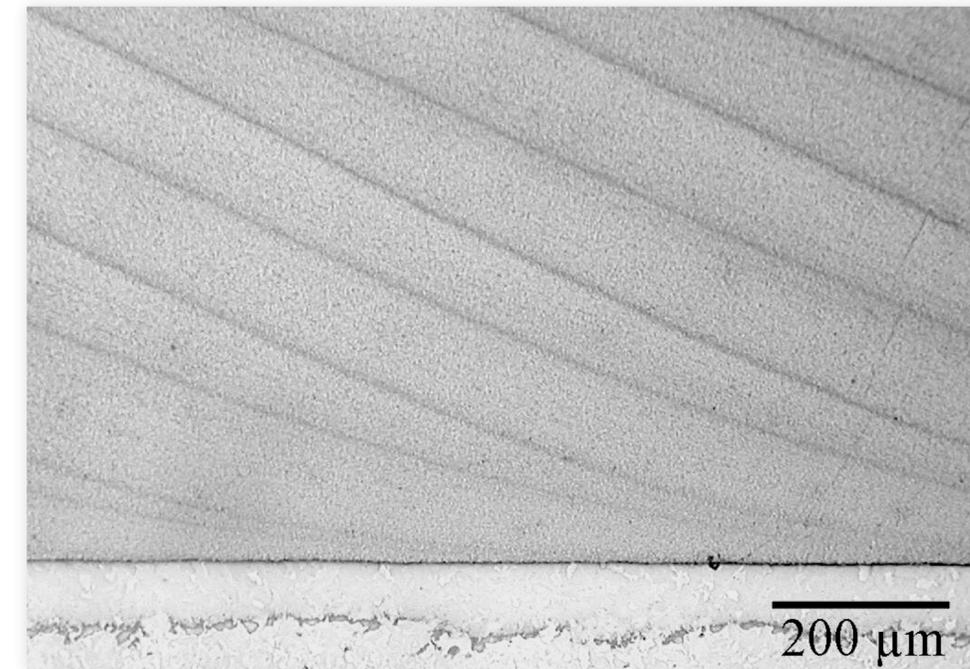
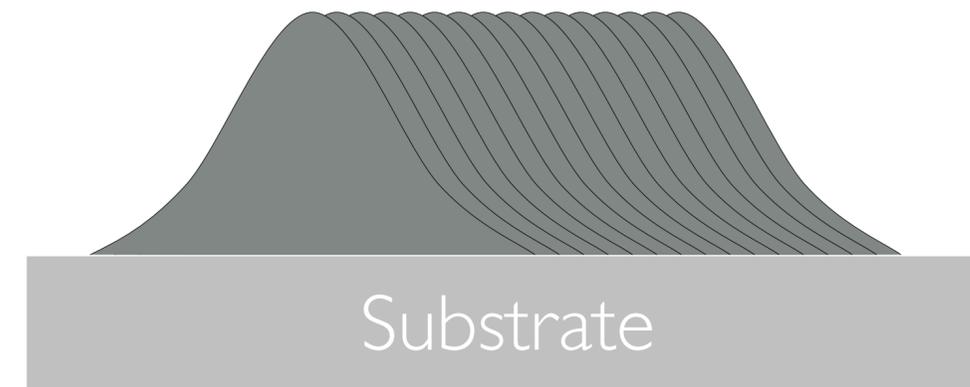
Kinetic Metallization System



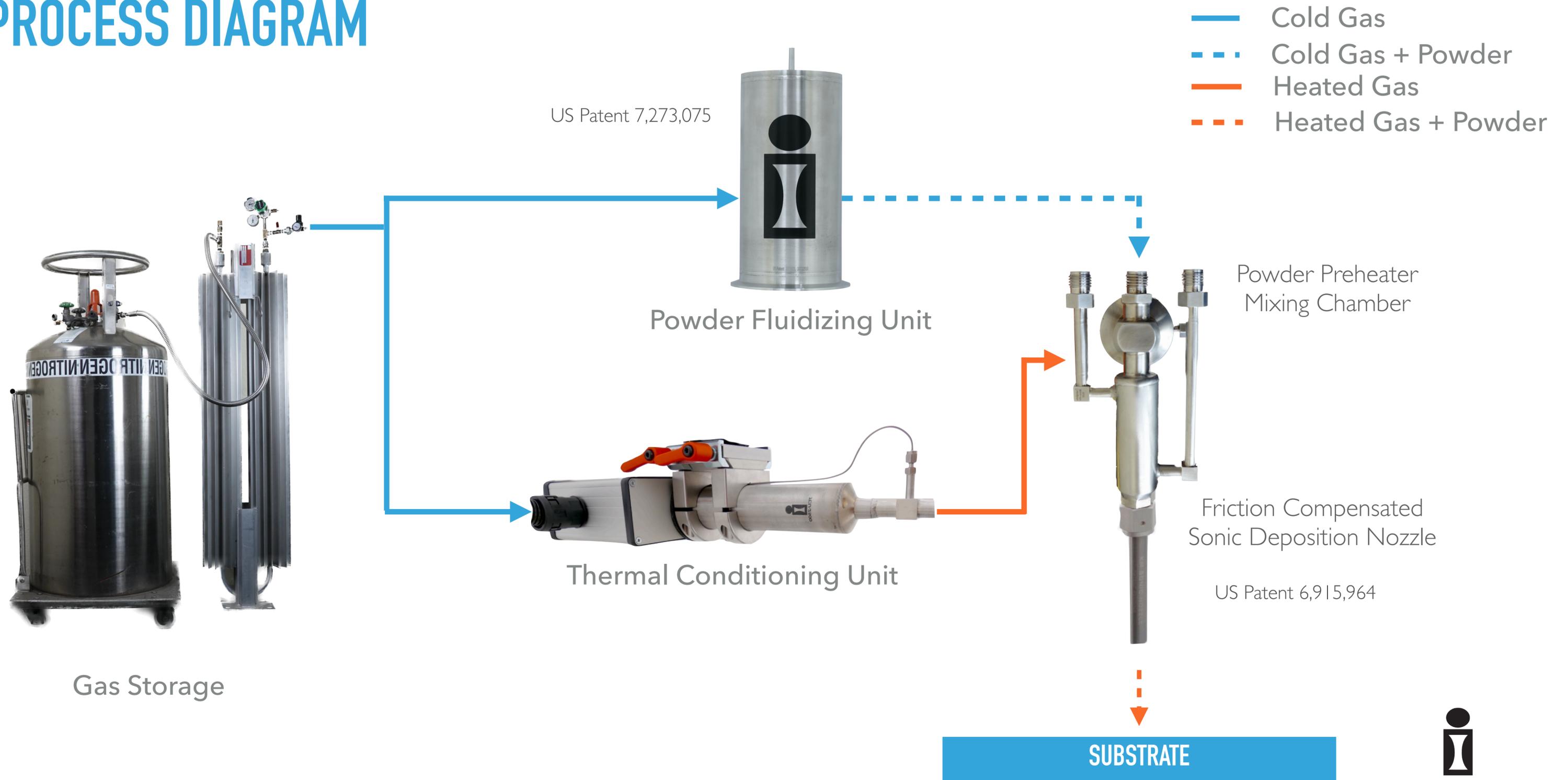
KM Repair of F/A-18 Radar Rack

WHAT IS KINETIC METALLIZATION?

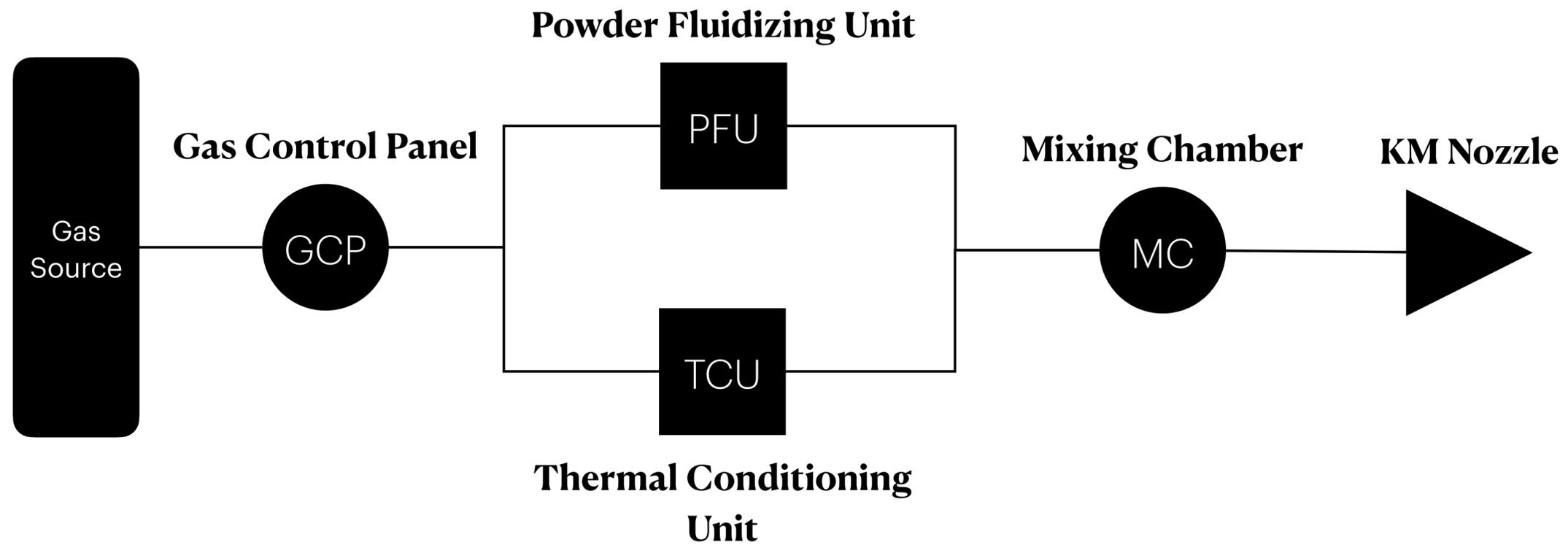
- ▶ Impact Consolidation Process
 - ▶ Feed-stock: Fine Powder
 - ▶ Accelerant: Inert Light Gas
 - ▶ Coatings, Repairs, Additive Manufacturing
- ▶ Solid State Process
 - ▶ No Melting



KM PROCESS DIAGRAM



Kinetic Metallization Gas Flow



Gas Control Panel

Pressure and mass flow devices



Powder Fluidizing Unit

Powder feeder



Thermal Conditioning Unit

Gas heater

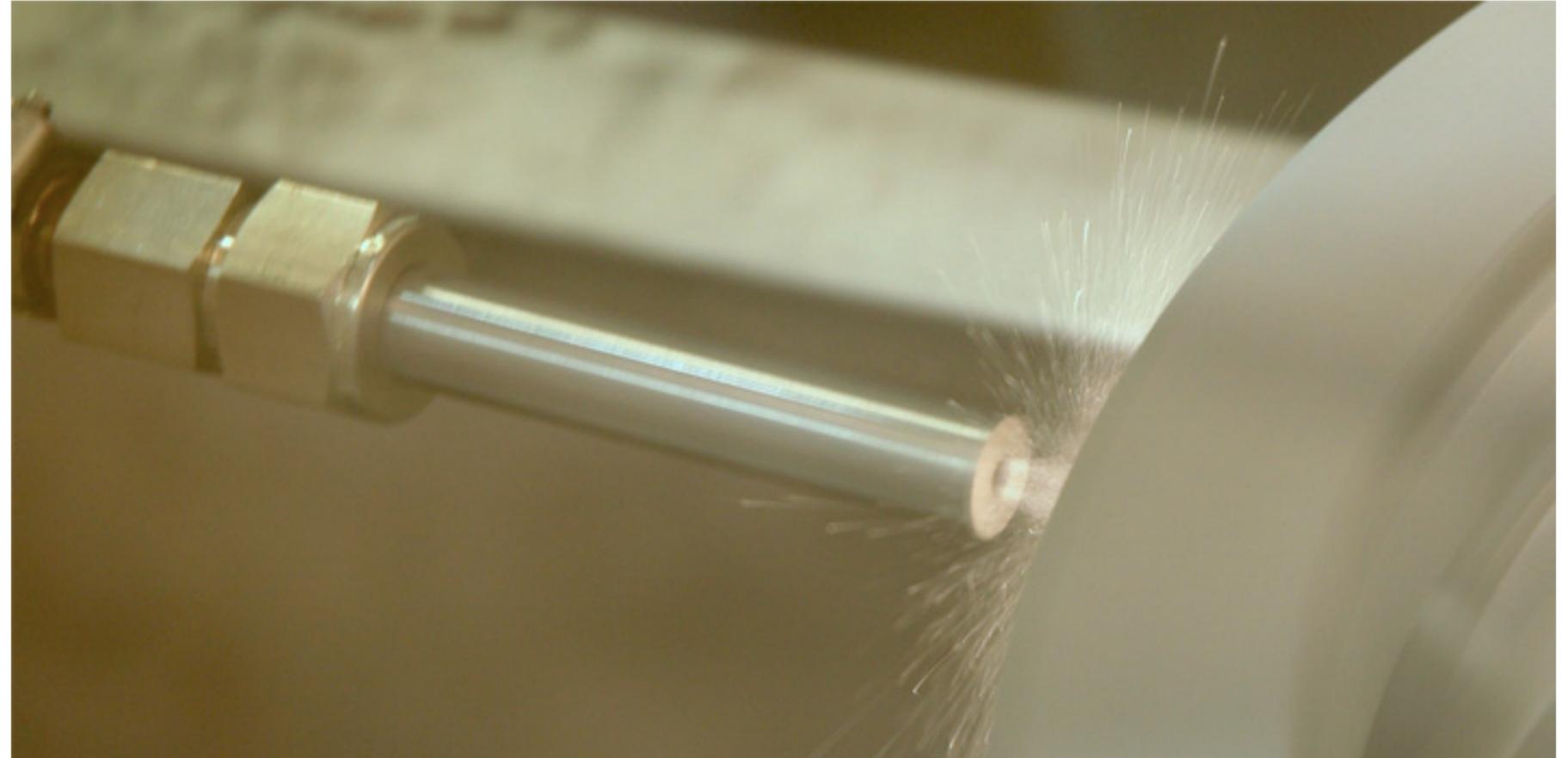


Mixing Chamber

Powder-gas blending

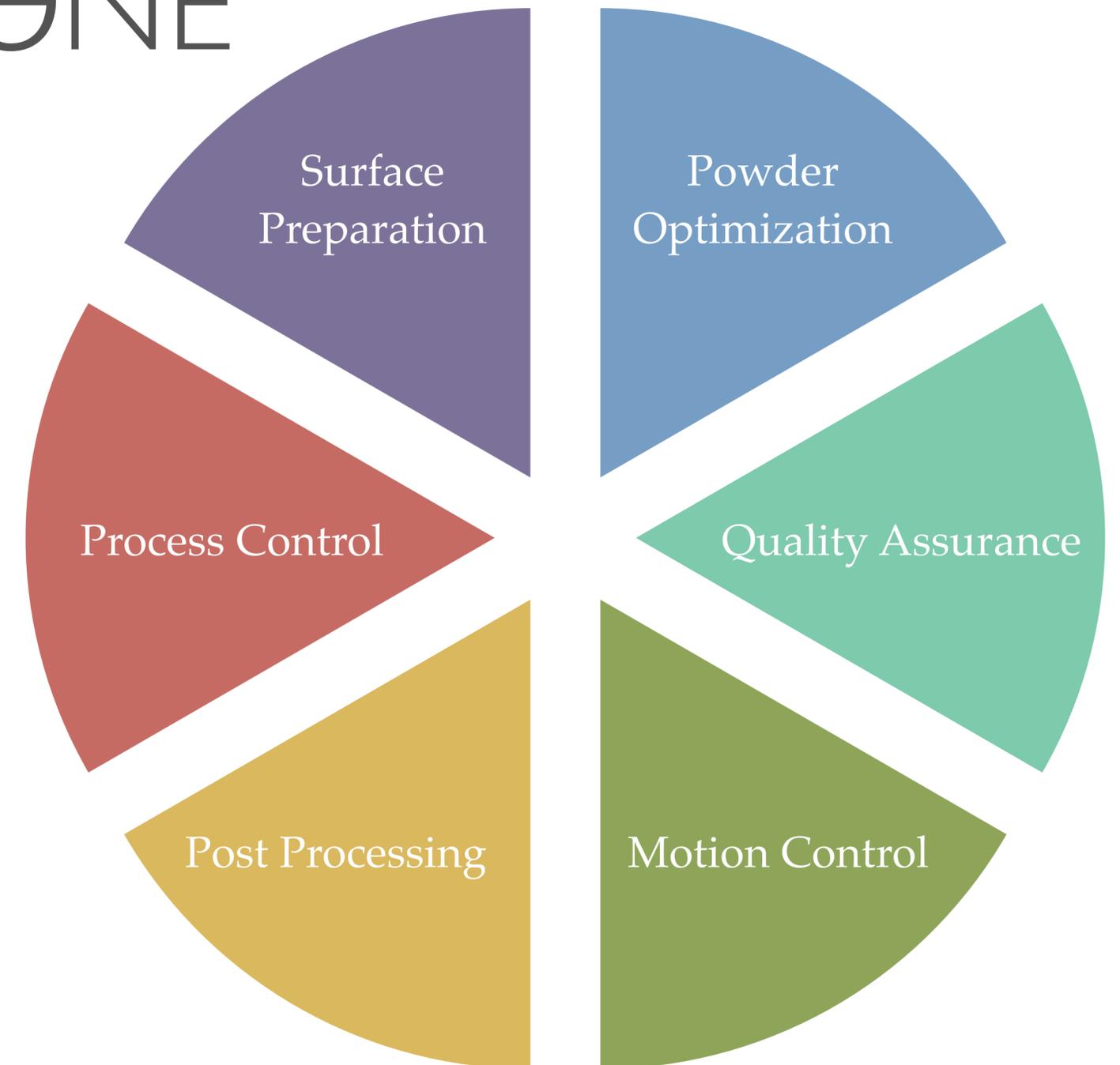
ADVANTAGES OF KM

- ▶ Low Temperature/Pressure Operation
 - ▶ Maintains Amorphous structure
- ▶ Minimal Oxide Formation
- ▶ No Decarburization
- ▶ Low Heat Input To Substrate
- ▶ Environmentally Compliant



'HÄRMΘNĒ^{KM}

- Kinetic Metallization
- Equipment / Feedstock / Procedure
- All 6 features are harmonized
- Results are reproducible and verifiable
- Each sprayed part is tied to a 100msec spray log and powder database



KM Compared to CS

	Kinetic Metallization	Cold Spray
Nozzle Type	Sonic	Supersonic
Particle Acceleration	Inlet and Outlet Duct	Inlet Duct
Maximum Particle Speed	Mach 1	Mach 1
Substrate Heating	Low	High
Flow	Lower gas flow 140 lpm N2	Higher gas flow
Variation Temp, Pressure, Powder Flow	Lower process variation	Higher process variation
Footprint	Smaller footprint	Larger footprint
Sound Pressure Level	Low 70 dBA	High > 120 dBA

ENVIRONMENTAL/HEALTH/SAFETY BENEFITS OF KM-HMF

- ▶ No Heavy Metals
- ▶ No Combustible Accelerants
 - ▶ Only Inert Gases
- ▶ Low Noise
- ▶ No Liquid Waste Stream
- ▶ Wear and Corrosion Resistant
- ▶ Non Line of Sight Application

