

# HCAT

## Mass Flow High Velocity Thermal Spray Cell

### SYSTEM OVERVIEW

HAI Advanced Materials Specialists Inc. HCAT HVOF Mass Flow System is a high performance high velocity oxy-fuel spray system designed to use either Hydrogen or Liquid Kerosene as the main fuel gas. Each system has been pre-qualified to meet the BPS 4013 Type II WC/Co/Cr 86/10/4 coating for Hydraulic Actuators and Landing Gear Components.

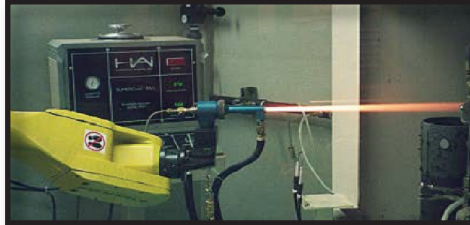
The system comes complete with either the SUPERCOTE™ HV<sup>3</sup> GHF Hydrogen fuel gun (Jet Kote™ or Diamond Jet™) or HV<sup>3</sup> G Liquid Fuel Kerosene Gun, Pedestal Mounted Mass Flow Control Console, Separate Roof Top mounted Gas Module, Powder Feeder, Chiller, Robot, Spray Hood and optional Dust Collection equipment.

The entire system has been designed to either operate as a stand-alone manual system or as a fully automated Robotic Spray Cell.

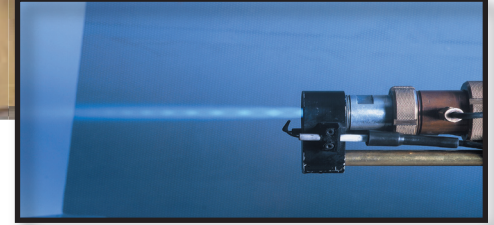
The SUPERCOTE™ HV<sup>3</sup> HF system is designed to operate with Hydrogen as the main fuel gas. The Hydrogen gas mass flow meter is completely isolated from the rest of the electrical and mechanical systems for safe and trouble free operation. The ignition sequence is designed to operate with a gas purge before and after each cycle to ensure a clean and safe start.

The SUPERCOTE HV<sup>3</sup> G system utilizes liquid fuel kerosene by premixing the Oxygen gas and liquid fuel at high pressure into a combustion chamber where they burn to produce a hot high-pressure gas stream.

Both of these systems are designed to produce a hot gas flame by constricting the exhaust gas and then expanding the gas through a long bore nozzle thereby producing a hot gas stream accelerating to Mach Velocities. This gas stream heats and accelerates the powder particles so they impact with tremendous kinetic energy to form extremely dense and hard coating structures.



*Hydrogen Fuel Gun*



*Kerosene Fuel Gun*

### FEATURES and BENEFITS

- Pre-Qualified to Meet Boeing BPS 4013 Type II Coatings
- Uses Kerosene or Hydrogen Fuel as Main Fuel Gas
- PLC Process Operated Using Seimans Software
- Fully Automated and Integrated for Robotics (Fanuc M16iC or M710iC)
- Customized Motion for Precision and Reliability Using 7th Axis Coordinated Motion Spindle
- Compact Pedestal Mounted Control Console
- Safety Interlocks
- Easy to Operate and Maintain

## COMPONENTS/ SPECIFICATIONS



### Control Console:

Model - SUPERCOTE™ HV<sup>3</sup> C  
 Power Req. - 110 Vac Single Phase,  
 13 amps  
 L x W x H - 3.4' x 1.5' x 1.5'  
 Weight - 250 lbs.

### Kerosene Fuel Gun:

Model - SUPERCOTE™ HV<sup>3</sup> G  
 Weight - 15 lbs.

### Hydrogen Fuel Gun:

Model - SUPERCOTE™ HV<sup>3</sup> GHF  
 Weight - 10 lbs.

### Powder Feeder:

Model - SUPERCOTE™ HV<sup>3</sup> P  
 L x W x H - 3.4' x 1.5' x 1.5'  
 Weight - 250 lbs.

### Chiller:

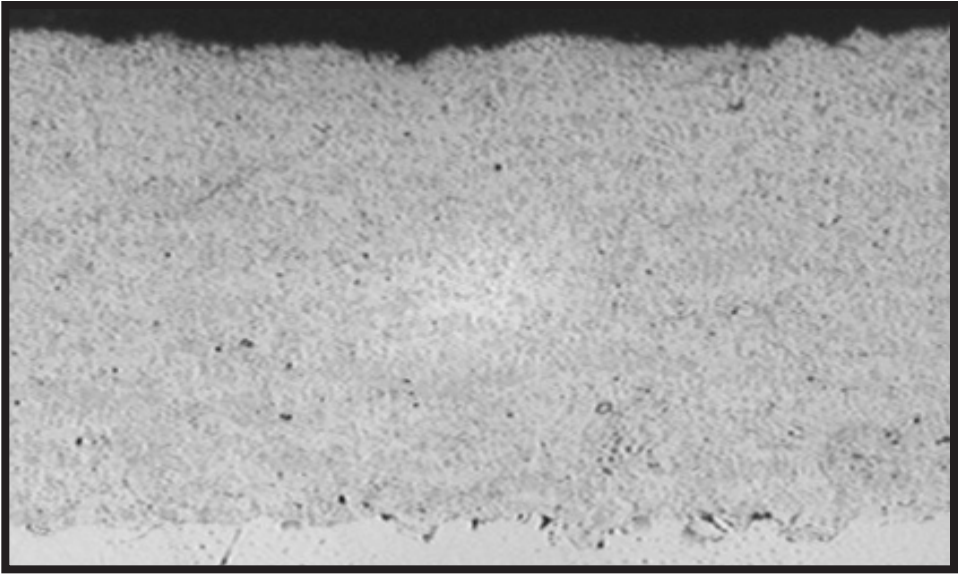
Model - HA 2500 AC  
 Power Req. - 460 Vac 60 Hz 3  
 Phase 32 amps @ 460 Vac  
 Fluid Pump/GPM - 15 @ 100 psi  
 Capacity - 25 tons  
 L x W x H - 92 1/4" x 38 x 75"  
 Weight - 3000 lbs.

### Spray Hood (integrated):

Model - HD IC  
 L x W x H - 4' x 4' x 5'  
 Weight - 400 lbs.

### Robot:

Model - M16iC or M710iC  
 L x W x H - 5' x 3' x 6'  
 Weight - 1000 lbs.



HA 8350 Photomicrograph  
 (200X)

The photomicrograph above is an actual representation of HAI AMS's HA 8350 coating produced using HAI's Supercote HV<sup>3</sup> HF system. The following micrograph was qualified to meet Boeing BPS 4013 Type II and the actual test results are shown below. The photomicrograph is shown at 200x and was lightly etched using Murikamis solution in order to accentuate the WC particles.

TEST METHOD	TEST REQUIREMENTS	HA 8350 RESULTS
Microhardness (HV <sub>300</sub> )	1100-1350	1280
Maximum Oxide Content (% of area)	<1%	<.2%
Maximum Oxide Content at Bondline (% of area)	<10%	<5% (primarily abrasive particles)
Maximum Internal Porosity (% of area)	<1%	<.5%
Maximum Foreign Particle Inclusion	<.5% Metallic <.5% Non Metallic	Pass
Bend Test Results	No loss of adhesion or spalling	Pass
Alem Test Strips	.003" - .012" Compression	Pass
Tensile Adhesion Test	>10,000 psi	Pass

HAI AMS is an official Integrator of Fanuc Robotics. For more information visit Fanuc on the web at <http://www.fanucrobotics.com/index.asp?item=1045&name=System+Integrators&sit>

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