



High Velocity Oxy-Fuel Spray Process (HVOF)

A1 Metallising Services operates a Sulzer Metco High Velocity Oxygen Fuel System to apply coatings for the industry, as illustrated in the diagram below.

This HVOF system produces premium quality hard, dense coatings exhibiting high adhesion to the substrate and excellent wear resistance for extended component longevity and profitability.



Typical Diamond Jet HVOF System

Theory of Operation:

The High Velocity Oxygen Fuel process efficiently uses high kinetic energy and controlled thermal output to produce dense, low porosity coatings that exhibit high bond strengths, low oxides and extremely fine as-sprayed finishes. The coatings have low internal residual stresses and therefore can be sprayed to a thickness not normally associated with dense, thermal sprayed coatings.

This process uses an oxygen-propane mixture. The coating material, in powder form, is fed through the gun, using nitrogen as a carrier gas. The fuel gas is mixed with the oxygen in a siphon system in the front portion of the HVOF gun. The thoroughly mixed gases are then ejected from the nozzle and ignited outside of the gun. The ignited gases form a cylindrical flame configuration that surrounds and uniformly heats the powder spray material as it exits the gun and is propelled to the workpiece surface.

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As a result of the high kinetic energy transferred to the particles through the HVOF process, the coating material generally does not need to be fully melted. Instead, the powder particles are in a molten state and flatten plastically as they impact the workpiece surface. The resulting coatings have more predictable chemistry that are homogeneous with a fine granular structure.

High velocity Oxygen Fuel coatings can survive harsh service conditions, particularly in the wear and many corrosion applications, which greatly increase service life. The smooth as-sprayed surface, uniform chemistry and low porosity of the coating can be finished to very smooth surface profiles.

Features and Benefits

- Excellent bond coatings
- Dense with low porosity
- Very high coating thickness
- Optimized microhardness
- Predictable coating chemistries
- Smooth as-sprayed surface finish
- Excellent machined surface finish
- Dense, tightly bonded coatings
- Superior adhesion
- High bond strength

Typical Applications

- Rebuild and Salvage Operations
- Abrasion and Erosion Resistance
- Sliding Wear Resistance
- Resistance to Fretting, Galling, or Adhesive Wear
- Resistance to Cavitation Effects
- Resistance to Chemical Attack
- Control of Oxidation and Sulfidation
- Atmospheric and Heat Corrosion Control

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