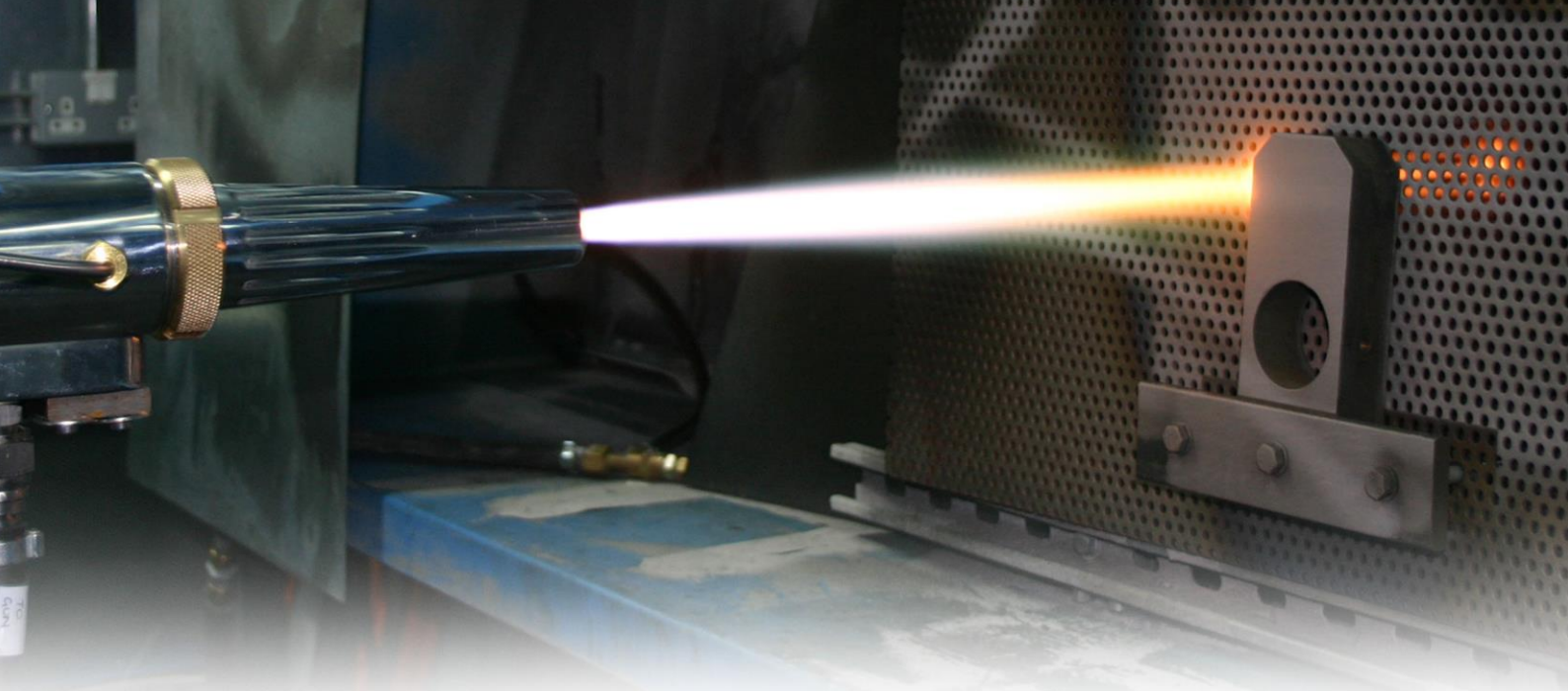


## HVOF Engineering Applications



An introduction to High Velocity  
Oxygen Fuel sprayed coatings



### **High Velocity Oxygen Fuel (HVOF) coatings**

HVOF is a high energy thermal spray process which produces dense, strong coatings of cermets and metals which give excellent performance in demanding, aggressive, wear and corrosive environments.

HVOF coatings are an important part of advanced surface engineering which enable us to salvage and improve components.

This enables machinery & process equipment to last longer, perform better and be less damaging to our environment.

The HVOF process is used in key industries such as oil and gas, power, water, mining, petrochemicals, chemicals, aerospace, paper, engineering and manufacturing.

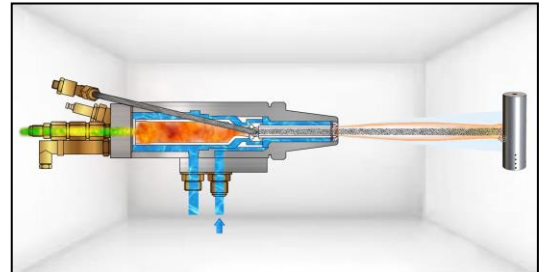
HVOF coatings can be used as a replacement for environmentally damaging Hard Chrome.

HVOF is a relatively cool process which leads to minimal distortion or metallurgical change to the work piece or sprayed material.

### **HVOF Coating Benefits:**

- **Extremely hard. Up to 1400 HV**
- **Dense , low porosity < 1%**
- **Very high bond strengths >80 Mpa**
- **Allows designers to use less expensive, lighter and more easily processed base materials**
- **Used to reclaim and salvage worn and damaged components**
- **Quick to apply. Reduces downtime**
- **Hard Chrome Replacement**
- **Low environmental impact compared to electroplating processes**
- **Widely used in many advanced engineering applications**

## HVOF Process



- Oxygen / liquid fuel (kerosene) ignites in combustion chamber
- Combustion gases accelerated through nozzle (Mach 3+)
- Powder injected into gas stream
- Gas exits nozzle at up to 2200 m/s, Particle velocity 300 – 700 m/s (Mach 1=340 m/s)
- Particles soften and impact substrate at high velocity
- Gas fuel systems are also available

### Some HVOF Sprayed Materials

Material	Reference	Hardness	Finishing process	Properties
Nickel Chrome Boron	99 325/32	60Rc	Ground	Very good corrosion resistance, hard and tough. These strong, dense coatings give excellent service in many aggressive wear and chemical environments. Hard Chrome Plate Replacement.
Tungsten Carbide Cobalt 88/12	99 725/32	1350Hv 0.3	Diamond ground	Extremely hard, tough and dense. Often used in the most arduous wear/ erosion environments. Widely used in oil and gas applications on valves, down hole tools, drill bits etc. Also used on aircraft landing gear. Hard Chrome Plate Replacement.
Tungsten Carbide Cobalt Chrome 86/10/4	99 745/32	1250 Hv 0.3	Diamond ground	Extremely hard, tough and dense with improved corrosion resistance over cobalt only carbides. Most widely used on gate and ball valves in demanding environments. Hard Chrome Plate Replacement.
Chrome Carbide Nickel Chrome	99 785/33	1150 HV 0.3	Ground	Excellent corrosion resistance including hot gases. Hard and wear resistant up to 815°C. Often used to combat wear and erosion at elevated temp.
Inconel 625	99405/32	46 Rc	Ground	Excellent corrosion and temperature resistance, high-strength, non-magnetic properties find many applications in marine, oil and gas and aerospace.
Stellite 6	99856/32	54 Rc	Ground	These hard wearing, high-temperature, corrosion resistant alloys are widely used in many demanding applications.

\*Stellite is a trade mark of Deloro Stellite

## Common Applications of HVOF Coatings

- **Pumps**
- **Valves**
- **Seals**
- **Actuators**
- **Rams**
- **Impellers**
- **Pistons**
- **Shafts**
- **Bearings**
- **Wear Rings**
- **Downhole Tools**
- **Drilling Tools**
- **Landing Gear Legs**
- **Flap Tracks**
- **Gas Turbines Shafts**
- **Pulp and Paper Rollers**
- **Print and Packaging Rollers**
- **Traction Rollers**
- **Agitators and Stirrers**
- **Cylinder Bores**
- **Wire Drawing Capstans**

