

# METALLISATION HVOF ALTERNATIVES TO HARD CHROME PLATING

## Application Data Sheet LE-WR-001

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### INTRODUCTION

Chrome plating has been accepted and used for many years to provide hard wearing surfaces, however; American environmental legislation as forced the closure of many, many US plating contractors.

To continue legal operations, those US contractors that have wished to remain in business have had to make major investments in new equipment and chemical handling plant.

To achieve a return on the funds invested, inevitably, Chrome plating prices have had to increase dramatically.

The reduction in plating capacity as a result of plant closures has contributed further to price increases.

EUROPE is now following.

Dense, hard coatings produced by the Metallisation High Velocity Oxygen Fuel (HVOF) system, can provide technically and commercially viable alternatives.

### EQUIPMENT

Metallisation 4L HVOF System

## MATERIALS

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### Coatings used include

- ✦ 99408/32 - Iron Chrome Molybdenum Alloy
- ✦ 99325/32 - Nickel Chrome Boron Silicon Hardfacing Alloy

- ✦ 99735/32 - Tungsten Carbide 17% Cobalt Alloy
- ✦ 99745/32 - Tungsten Carbide 10% Cobalt 4% Chrome Alloy

These materials each have their own niche in terms of the properties they offer the Design Engineer

- ✦ 99408/32 - Iron Chrome Molybdenum Alloy  
Resistant to Wear and Corrosion at up to 650°C.
- ✦ 99325/32 - Nickel Chrome Boron Silicon Hardfacing Alloy  
Coatings applied are extremely dense and semi-fused in the as-sprayed state. They offer very good Corrosion and Acid Resistance.
- ✦ 99735/32 - Tungsten Carbide 17% Cobalt Alloy  
An exceptionally tough coating with good impact resistance for sliding wear applications.
- ✦ 99745/32 - Tungsten Carbide 10% Cobalt 4% Chrome Alloy  
Corrosion resistant coatings with extremely high resistance to abrasive & sliding wear, widely used in seawater environments.

## HVOF BENEFITS OVER CHROME PLATING

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### The 4L offers a number of benefits over Chrome Plating

- ✦ No plating tanks to maintain.
- ✦ No disposal of toxic solutions.
- ✦ No water treatment plant.
- ✦ No limitation on component size.
- ✦ No heat treatment required.
- ✦ No acid solutions involved, hence no hydrogen embrittlement, thus improved component toughness.
- ✦ Coatings can impart compressive stresses on the substrate, improving fatigue behaviour.
- ✦ Coatings are denser with no crack crazing.
- ✦ Microporosity assists in the retention of lubricating films.
- ✦ Fewer process steps.
- ✦ Improved stock control from in line processing.
- ✦ Low capital investment.
- ✦ Low installation costs.
- ✦ Improved process control.
- ✦ Competitive coating costs.

## The Metallisation HVOF utilizes fewer process steps

### 4L Thermal Spray

- (a) Degrease
- (b) Gritblast
- (c) Spray
- (d) Finish Grind

### Hard Chrome Plating

- (a) Degrease
- (b) Alkaline Wash
- (c) Rinse
- (d) Etch
- (e) Rinse
- (f) Plate
- (g) Rinse
- (h) Dry
- (i) Finish Grind

## THE METALLISATION HVOF OFFERS HIGH COATING RATES

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### 4L Thermal Spraying

A single 4L System gives:

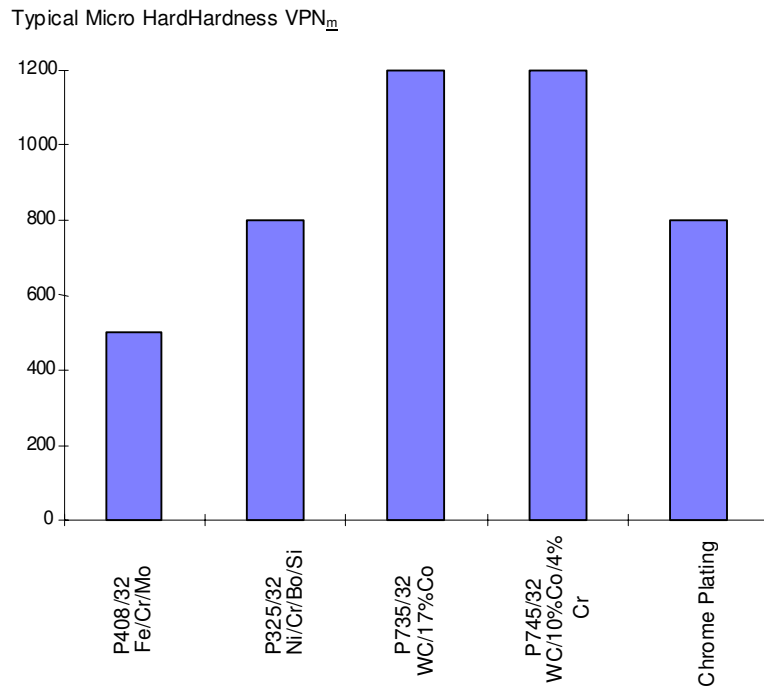
Typical Spray Rate of: 4.5Kgs/Hour

Resultant Coverage of: 12.5m<sup>2</sup>/Hour at a coating thickness of 25µm

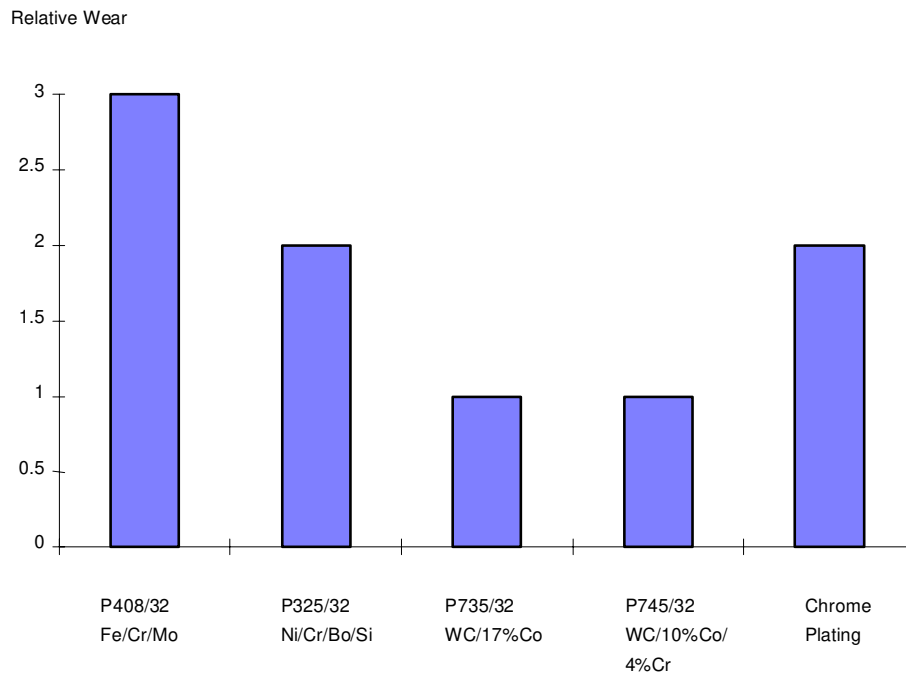
### Hard Chrome Plating

Plating plants usually treat at a rate of 25µm coating thickness per component hour.

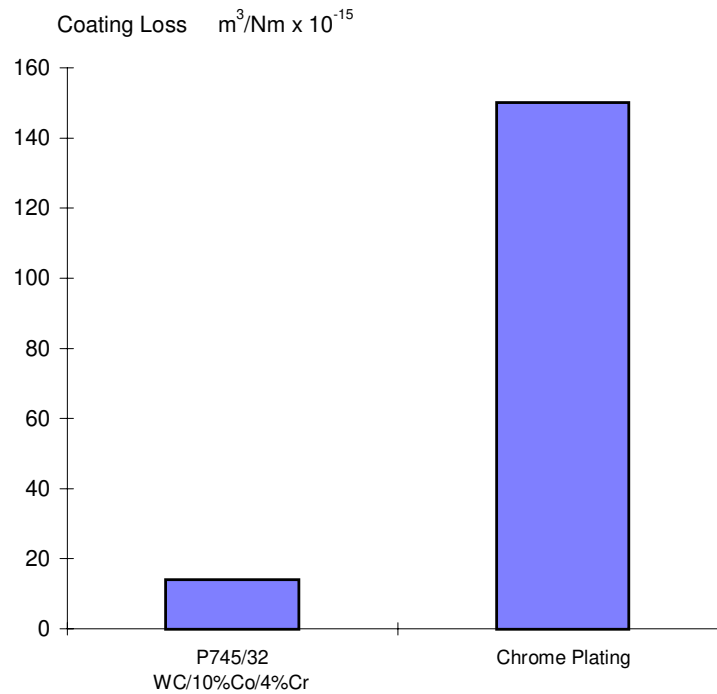
## Metallisation HVOF produces dense hard coatings



## Metallisation HVOF Coatings give good Abrasive Wear Properties



## 4L Coating Durability measured by ASTM G65 Dry Sand Rubber Wheel Abrasion Test



### Metallisation HVOF Coatings offer Environmental Benefits

- ✦ No Hexavalent Chrome.
- ✦ No Chemical Solutions to control.
- ✦ No Water Treatment Plant.
- ✦ No Toxic Solutions to be disposed of.
- ✦ Overspray from the HVOF can be recovered and sold as metal scrap.

## **Metallisation HVOF Coatings as alternatives to Chrome plating find applications in many industries**

- ✦ Pump Manufacturers – OEM.
- ✦ Pump Repairs.
- ✦ Textile Machinery.
- ✦ Printing Industry – OEM.
- ✦ Print Machine Repairs.
- ✦ Petrochemical.
- ✦ Automotive.
- ✦ Plating Shops.
- ✦ Aerospace – Actuators.
- ✦ Aerospace - Undercarriage Systems.
- ✦ Earthmoving Plant.