
KERMETICO
Coatings Beyond State of the Art HVOF Limitations.
2017
Kermetico.com
200x
0.002 inch
3-0350
WC-10Cr-4Cr_1049-1

HVOF WCCoCr Coatings Rivalry: a Zero-Sum Game

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- Tungsten carbide is the most widely sprayed wear-resistant coating. HVOF is currently the standard WC deposition method and WCCoCr accounts for the largest HVOF business segment.
- Lot of customers perceive HVOF WC coatings as prohibitively expensive, because:
  - Costs of powder, oxygen, and spare parts are high
  - Spray rates are low -> many expensive workhours to spray
  - Deposition efficiency is low
- HVOF WC quality does not justify the cost:
  - WC decomposes at high HVOF temperatures, making coatings brittle
  - Mechanical properties of HVOF WC are still far from theoretically possible
  - Process deviation is high -> quality is not consistent

  Result 1: Tungsten carbide coating is too expensive for many applications.

- Substitutes are present, each of them having its own problems:
  - Hard chromium electroplating is carcinogenic
  - Laser clad and PVD/CVD coatings cannot reach WC performance, but growing

  Result 2: Growing competition squeezes HVOF spray shops profits.

HVAF: a Win-Win Solution for an End-User and a Shop

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- Kermetico HVAF Systems

5+ times higher spray rates than conventional HVOF. Gas fuel: propane, propane-butane, propylene or natural gas. Axial powder injection. Minimized material decomposition and oxidation. One system – many guns. Blast & spray with one gun.

- Job Shop Gets Competitive Edge

Exceptional HVAF deposition rate while meeting quality standards.

Unprecedented technological efficiency. Safe (no flashback possible).

Works with an existing HVOF infrastructure. Easy to operate and support.

Less than ½ of the conventional HVOF WC coating cost.

- End-User Gets New Quality & New Applications

Higher coating quality for existing materials: high density and strength, high hardness combined with ductility (no embrittlement), consistent quality. Low roughness of as-sprayed coatings. New geometries and new materials are feasible for High Velocity spray: Ag, Al, Cu, Sn, Ti, etc.

Our Product Line

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- **Kermetico AK – Multi-Purpose Gun Family**

No pure oxygen → high hardness, less cost, temperature, oxidation. Fine powders → high coating density and ductility. OD, ID and hand-held guns. The spectrum of spray materials from Aluminum to Tungsten Carbide. Proven performance record.

- **Kermetico Convertible System Complying with HVOF Specifications and Outperforming Them**

Runs in either HVAF or HVOF mode. Keeps most of the HVAF advantages spraying HVOF-cut powders. The highest spray rate and deposit per pass. Exceptional deposition efficiency while meeting quality standards.

- **Kermetico Specialized Systems**

Special HVAF systems configured to get the best possible quality/cost ratio for an specific applications. Optimized to spray particular functional coatings.

Kermetico Multi-purpose

- Multi-Gun HVAF AK Family
- AK7 – High power gun for spraying metals, alloys, and carbides onto large parts with the best cost and quality; Spray rate – 33+ kg/hour
- AK6 – a thermal spray gun to deposit tungsten carbide onto a spectrum of parts; maximum spray rate – 28 kg/hour
- AK5 – a compact spray gun to deposit coatings onto smaller parts, thin walls and internal surfaces; maximum spray rate – 15 kg/hour
- AK-ID – a gun to spray internal diameters 80 mm and larger and a rotating AK-IDR gun to spray bores 100 mm and larger to 600 mm deep; maximum spray rate – 5 kg/hour
- AK-HH – a hand-held HVAF gun to spray manually on-site or onto complex surfaces; gun weight 2.5 kg; maximum spray rate – 15 kg/h

All the equipment is air cooled, operated by a mobile operator Tablet + digital PLC. More than 60 systems are at work worldwide.

Kermetico Convertible

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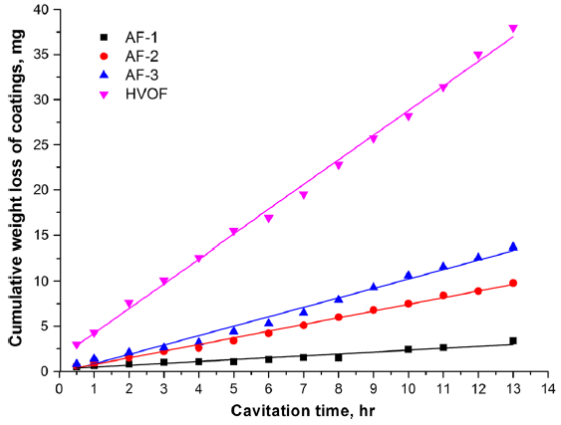
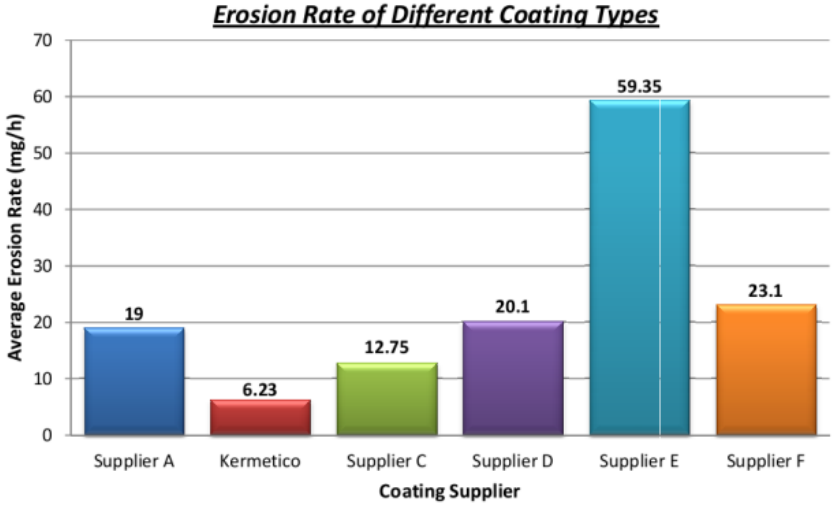
Hybrid HVOF or HVAF mode.

- Meet-the-spec in HVOF mode: the same HVOF-cut powder, process and infrastructure with a higher DE, higher spray rate and ½ the cost
- Beyond the spec HVAF mode: fine material, no Oxy, higher-value coatings. Harder, denser, less brittle, ductile, non-permeable, smooth as-sprayed coatings
- You can mix the lines: C7, C6 + AK-HH, AK-ID, SL in an installation



Cavitation Resistance, CPRI, India



Wear Resistance, Schlumberger, USA

Kermetico Specialized

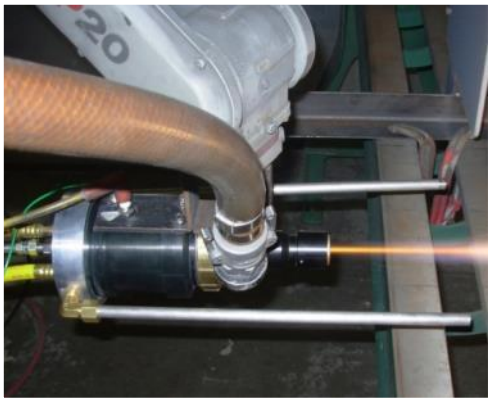
The Excellence of Functional Coatings

S systems are configured to deposit functional coatings with the quality required at the lowest cost possible.

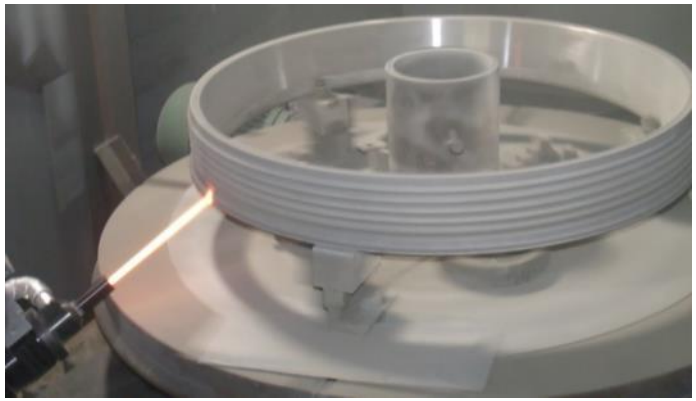
STi – a system designed to spray titanium and Ti alloys

SL – a special gun for low melting point materials deposition: aluminum, brass, bronze, copper, tin and zinc

SP – a system tuned to spray precious metals, like gold or silver



The STi Gun Spraying Titanium



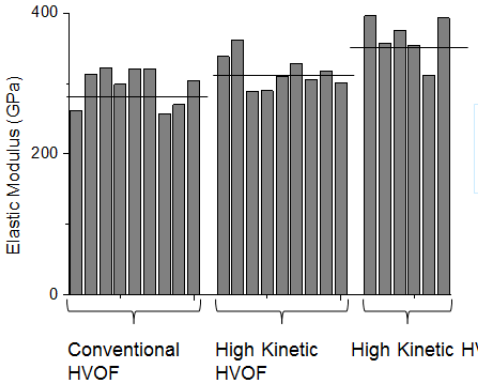
The Low Melting Point SL Gun Spraying Tin

System Control

- PLC-based, mass-flow controlled system
- Industrial IP67 rated tablet is the basic operator control of a gun and all external devices
- Works consistently with propane, propane-butane, propylene, natural gas
- Variety of powder feeders with canisters from 3.3 to 10.4 liters, with a weight loss control option
- Gas control unit with fully isolated compartments
- Optional interface to monitor and troubleshoot equipment at any authorized internet-connected device

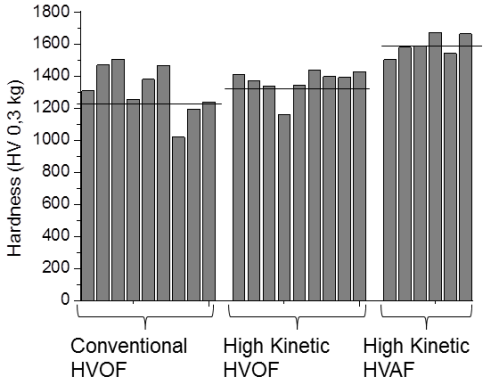
HVAF Coating Quality

WC-10Co-4Cr Elastic Modulus (GPa)

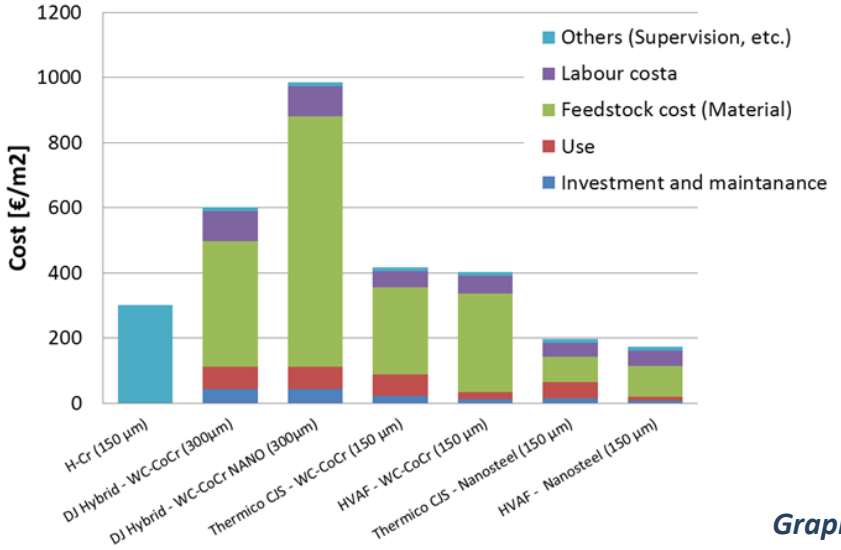


High kinetic HVAF: Closer to bulk-like structure

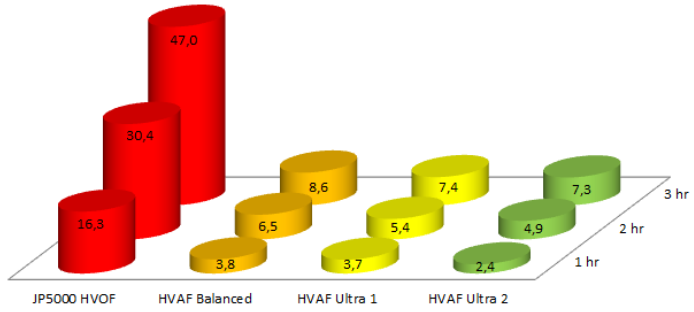
WC-10Co-4Cr Hardness (HV_{300})



High Kinetic HVAF: Increased hardness without increased brittleness



Cumulative Weight Loss of WC-10Co-4Cr Coatings During Silt Erosion Test, mg



Graphics are cortesy of VTT, Finland (top) and CPRI, India (bottom)

Made for Manufacturing

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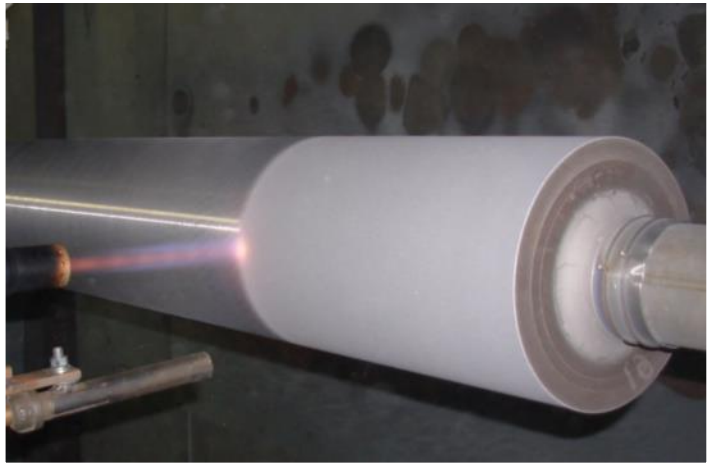
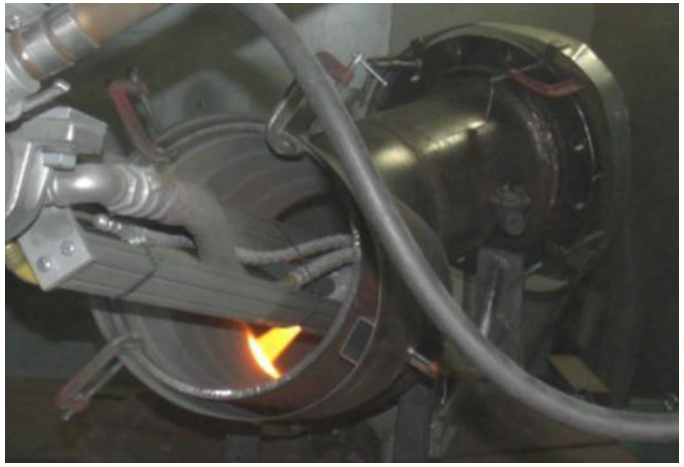
Our systems are designed by sprayers for sprayers:

- ✓ Use an existing HVOF infrastructure
- ✓ User-friendly, several guns with the same system → easy to learn
- ✓ High technological efficiency → it is really hard to make a poor coating
- ✓ Axial powder + simple design→ long-lasting, easy to change spare parts
- ✓ Hardness deviation 6% → fewer QC issues
- ✓ No vapors of spraying powder → no health hazards



Blast & Spray with One Gun:
10x Faster, One Setup



A Double Elbow Sprayed with the Rotating ID Gun

Business Benefits

1. Buy and use fewer systems, investing four times less in a new Job Shop. Each Kermetico gun sprays 5x faster than HVOF, and there is an option to switch to an ID or a hand-held gun with the same system.
2. Return your HVAF investment depositing second ton of WCCoCr. How?
   - ✓ The spray rate is up to 33 kg/hour with the deposition efficiency higher than 60%. Fewer work hours means fewer hours to pay for. And with our system you need to spray just a fraction of the HVOF spray time
   - ✓ No oxygen – just compressed air, which costs 10 times less
   - ✓ Easy-to-change specialized guns allow spraying each part in the most efficient way
   - ✓ Cost of spare parts is 1/10 of HVOF for the same work
3. Eliminate the blasting room – blast and spray with one setup to reduce manufacturing time, improve quality and reduce blast media consumption by a factor of 100.
4. Reduce as-sprayed coating thickness and grinding time due to the low roughness of the as-sprayed coating.

You will spend up to 5 times less on each item sprayed!

Kermetico.com

Each of our developers has more than 30 years of coating experience. We have been designing and producing our equipment in California, USA, since 2006.

More than 60 systems are at work worldwide, 20 of them are in Universities and Labs; more than 100 academic papers have been published showing HVAF superiority over HVOF. We and our partners have sprayed thousands of customer parts with no rejection.

Visit our job shop and watch the process:

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Benicia, CA 94510, USA,

+1 707-745-3862

Watch our videos

or read more at our website

kermetico.com