

— CUSTOMER CASE STUDY

FROM 12 INCHES TO 2.5

How Extreme Coatings stopped turning away small-bore work —
and what changed in their powder bill when they did.

THE SHORT VERSION

A capability floor removed, and a powder bill that changed with it

THE CONSTRAINT	Extreme Coatings (St. Petersburg, FL) could not apply internal-diameter HVOF below 12 inches. Work smaller than that left the building.	
THE CHANGE	Spraywerx ID-Nova MK7 and Mini-Nova torches took their internal capability down to 2.5 inches (63.5 mm).	
THE MEASURED RESULT	Deposition efficiency above 70% on internal diameters — Spraywerx measured, data on request — the difference between buying 2.2 kg of powder per deposited kilogram and buying 1.4.	
12" → 2.5" minimum internal diameter, before and after (305 mm → 63.5 mm)	70%+ deposition efficiency on internal diameters — Spraywerx measured, data on request	\$200+ per deposited kg that the efficiency gap is worth at 2026 prices

SECTION 01

The constraint: a floor at 12 inches

Extreme Coatings built its reputation on hard-wearing coatings for industrial equipment, with particular strength in extrusion — feed screws especially. Their HVOF capability was conventional in one respect that quietly cost them work: it could not reach inside a bore smaller than roughly 12 inches.

That floor is not unusual. It is where most line-of-sight HVOF equipment stops, and it maps almost exactly onto the parts where hard chrome keeps failing and customers keep asking for something better — hydraulic cylinders, pump housings, valve bodies, barrel bores. Every one of those enquiries was a quote they could not write.

SECTION 02

Why small bores are the hard case

Coating the inside of a small-diameter part compounds every problem in thermal spray at once:

STANDOFF COLLAPSES

In a tight bore the torch runs close to the surface, which narrows the window between a well-melted particle and an overheated one.

POWDER CUTS GET FINER

Fine WC overheats readily — driving decarburisation and brittle phases if the thermal history is not controlled.

**RADIAL INJECTION
WASTES FEEDSTOCK**

Particles injected across the jet ricochet off the bore wall instead of bonding. On the outside of a part that is a cost line; inside a bore it is the dominant one.

This is why deposition efficiency inside a bore is usually well below the 45–55% published for open-face HVOF — and why, at 2026 powder prices, the efficiency of an internal process is no longer a process detail. It is most of the cost of the part.

SECTION 03

What they deployed

Spraywerx ID-Nova MK7 and Mini-Nova torches, both engineered specifically for internal diameters, using axial injection — powder introduced along the jet axis rather than across it, which is the design decision that keeps particles in the stream and out of the bore wall.



Mini-Nova HVOF over a cylinder bore. Photo: National Research Council Canada.

SECTION 04

What changed

	BEFORE	AFTER
Minimum internal diameter	12 inches (305 mm)	2.5 inches (63.5 mm)
Deposition efficiency, internal	Not separately measured	Above 70% — Spraywerx measured, data on request
Small-bore enquiries	Turned away	Quoted and produced
Chrome-replacement work on internal surfaces	Limited by reach	Served on the same equipment

The efficiency figure is the one with the longest tail. At 45% deposition efficiency you buy 2.2 kg of powder for every kilogram that stays on the part; at 70% you buy 1.4 kg. In 2024 that gap was worth roughly \$80 per deposited kilogram. At 2026 Western carbide prices it is \$200 or more — before labour and gas — which means the same equipment decision is worth several times today what it was worth when it was made.

Wear performance: HVOF WC-CoCr is the DoD/HCAT-validated replacement for hard chrome, rated equal or superior including fatigue behaviour on high-strength steel, with independent testing (TWI) showing 4–5x the abrasion resistance of hard chrome. Performance on any specific part depends on wear mode, geometry and process parameters.

In Curt Kadau's words

“Spraywerx's technology has fundamentally transformed our coating capabilities. Where we were once constrained to larger diameters, we can now apply high-performance HVOF coatings with precision to small inside diameters as small as 2.5 inches. This breakthrough has enabled us to deliver advanced solutions across industries with demanding wear and corrosion requirements. The efficiency and reliability of Spraywerx's equipment have surpassed our expectations, and we are excited to integrate it further into our operations.”

Curt Kadau

PRESIDENT, EXTREME COATINGS

APPROVED SHORT FORM — EMAILS, SOCIAL AND COLLATERAL

Verbatim with elision, to be used in place of any paraphrase:

“Spraywerx's technology has fundamentally transformed our coating capabilities ... we can now apply high-performance HVOF coatings with precision to small inside diameters as small as 2.5 inches.”

SECTION 06

What this means for your shop

The transferable lesson is not that a torch made a shop money. It is that capability and efficiency are the same purchase. The equipment that reaches into a 2.5-inch bore is the equipment that puts a higher share of expensive powder onto the part — and in a year when tungsten repriced roughly six-fold, those two things compound.

Find out what your bores are costing you

If you are turning away internal work, or coating bores at an efficiency nobody has measured, the fastest way to find out what it is costing you is to run one part: a free 15-minute scoping call, and where it is warranted a prototype day at our North Vancouver facility on your actual component — hardness, porosity, adhesion, and a cost-per-part number with your part number on it.

SOURCES

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| 1. DoD/HCAT hard-chrome-alternative validation program | 4. Spraywerx measured DE above 70% on internal diameters |
| 2. TWI comparative wear testing (abrasion resistance vs hard chrome) | 5. Fastmarkets / CTIA tungsten benchmarks (Jun–Jul 2026) |
| 3. Published HVOF deposition-efficiency norms (45–55%) | 6. Trade-press WC powder prints (Mar 2026) |

Full numbered citation register maintained by Spraywerx; available on request.
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COMPANION DOCUMENTS

The 2026 Powder Economics Briefing The market figures cited here, dated and sourced	The Powder Selection Matrix Chemistry matched to wear mode, not habit	Cost-per-Part Calculator Run this arithmetic on your own parts at spraywerx.com
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SPRAYWERX TECHNOLOGIES

Patent-pending ID-HVOF technology for internal diameters down to 2.5" (63.5 mm). Thermal spray and laser cladding systems, powders, and coating development.

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