

ACCURACY EXCELLENCE

CONSISTENCY

SATISFACTION

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OUR GOAL: TOTAL CUSTOMER SATISFACTION





At Innovative Carbide we pride ourselves on delivering the highest quality tungsten carbide preforms using our unique and innovative manufacturing technologies. Our new state-of-the-art plant enables us to further improve our products, allowing us to offer consistently superior quality, precision, responsiveness and customer service. Total customer satisfaction remains our ultimate goal.

COMMITMENT TO QUALITY

Fast Quotes/Rapid Response



With one of the quickest turnaround times in the industry, we hope to surpass our customers' expectations on

requests for quotations (RFQs) while at the same time offering competitive pricing options.

On-Time Delivery

Eight to ten day delivery on all of our work is our commitment to our customers. An integral part of our pledge to manufacturing and service excellence is our fast turnaround on jobs and the complete satisfaction of the end user.

Excellence in Engineering

Our engineering staff is an experienced group of professionals who can assure our products will perform effectively relative to their unique requirements. Better quality tungsten carbide preforms give our customers' the competitive edge. We use the latest technology for our CAD/CAM programming that is linked to

> our computercontrolled CNC equipment.

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QUALITY IN-HOUSE, IN-THE-FIELD

MAKING A BETTER CARBIDE PREFORM USING THE NO-WAX PROCESS

Benefits of the no-wax process are improved material consistency and reliability due to the reduction of:



a. Carbon control problems b. Porosity

c. Shrinkage variations

MATERIAL CONSISTENCY:

Wax Process PROS

Carbide producers have been adding organic waxes and binders to carbide powders to improve the strength of the powder compact. This facilitates easier machining and reduces the chances for machining problems. Waxes do not improve the quality of the carbide material.

CONS -

1. Excess carbon or

"free carbon" porosity in the sintered part The introduction of organic waxes increases the chances for carbon control problems. Free carbon softens the carbide and reduces the wear resistance of the material.

2.Carbon deficiency

If too much carbon is removed during sintering, a brittle, secondary carbide phase known as eta-phase is created. Eta-phase can cause chipping, cracking or catastrophic failure.

3. Porosity

Porosity has a dramatic negative effect on the breaking strength of the sintered part. Material with residual porosity will have a lower transverse rupture strength (TRS) for a given carbide grade. Porosity can lead to premature wear, chipping, cracking and catastrophic failure.

4.Size variation

The presence of wax must be accounted for when considering the final shape of the sintered part. Because of the excess volume that the wax occupies in the powder compact, the chances for size variation due to distortion are increased.



No-Wax Process

PROS

With the no-wax process there are no additional variables that can affect the carbon balance within the sintered part. This means that the chances for carbon balance problems are significantly reduced.

CONS

There are no negative effects to the no-wax process during sintering.

Hip Processing (Hipping)

Wax Process

PROS

There are no benefits of wax in carbide powders during the hipping process. In fact, wax is partially responsible for adding this pressure-sintering step.

CONS

Because wax is used, many companies require hipping to remove residual porosity left by

the removal of the wax during the

sintering process. This pressure sintering forces liquid cobalt into the pores created by the removal of the wax binder.

No-Wax Process

PROS

Because

wax is not used, the need to add the additional hipping process is

reduced. If the carbide powder is properly milled during production and properly sintered, the benefits of hipping are negligible. Hipping should be used to guarantee the quality of the carbide, not to remove flaws in the carbide created by the production process.

CONS

There are no negative aspects of the no-wax process on the hipping of carbide.

SUMMARY

With the no-wax process, the chances for production errors that lead to the formation of free carbon, eta-phase and porosity are reduced. The material will have consistent properties that you can depend on from one order to the next. The consistency of the material properties such as hardness, TRS and wear resistance will conform to your specifications. If you require consistent material quality with dependable properties, superior strength and the capability to achieve a high-quality polished finish, you should rely on carbide preforms made with the no-wax process.



Pressing



Blended powders are isostatically pressed into billets that can be shaped in our production department. Using

state-of-the-art CNC equipment, we are able to satisfy our customers' particular drawing specifications.



Powder Mixing

Our elite powder mixing system produces a carbide powder that is uniform and consistent to assure products that will stand up in the field. Our exclusive no-wax process puts us at the technological forefront in the production of tungsten carbide preforms. Since we do not use the "crutch" of adding wax as a binder, we eliminate unnecessary and costly steps while creating a better and more consistent product. The end result is less in-field failure.

Shaping



Our fully-equipped CNC-controlled production facilities allow us to provide any and all shapes and sizes to fit our customers' manufacturing requirements, while at the same time ensuring accuracy and consistency on every job. We offer a variety of carbide products that serve



numerous industrial applications:

- Rectangular Blanks
- Compacting Dies
- Saw Blades
- Knives
- Stamping Blades
- Dies
- Draw Dies
- Seal Rings
- Wire Dies
- Nozzles
- Valves
- Seats
- Rods
- Step Blanks
- Blanks
- Can Tooling
- Bushings





■ Computer-Controlled Sinter-Hip Capabilities



Although our no-wax process virtually precludes the need for sinter-hip, it is available if requested. Our

computer-control capabilities allow accuracy of furnace vacuum and temperature, permitting optimum physical properties through the different sintering cycles.



Quality Control



Every phase of fabrication is subjected to 32 separate checkpoints to monitor purity and accuracy in mixing, pressing, shaping,

sintering and packaging. Metallographic optical microscopes are used to assure our customers are receiving the highest quality carbide in the industry. This commitment to excellence is second-to-none in the industry and demonstrates that we produce preforms that are uniformly consistent each and every time.



Innovative Solutions From INNOVATIVE CARBIDE



	IC-325	IC-320	IC-15	IC-155	IC-13	IC-311	IC-105	IC-9	IC-6	IC-6s	IC Grade	Z
	25%	20%	15%	15%	13%	11%	10%	9%	6%	6%	C0.%	Z
bide LL	C-17	C-14	C-13	SUB-MICRON	C-11,12	SPECIAL	SUB-MICRON	C-10	C-1,2,9	SUB-MICRON	Industry Code	
P 11040 P R 412-751	82.5-84.5	84.5-86.0	87.5-88.5	89.0-90.0	88.5-89.5	88.0-89.0	91.0-92.0	90.0-91.0	91.5-92.5	92.5-93.5	Rockwell 'A' Scale	VATIV
arker Drive ■ -6900 ■ 1-8	525,000	535,000	620,000	625,000	590,000	545,000	625,000	590,000	525,000	510,000	Transverse Rupture Strength (TRS) PSI	
l Irwin, PA 15 800-544-4338	470,000	500,000	560,000	650,000	600,000	610,000	700,000	625,000	710,000	850,000	Compressive Strength PSI	
;642 ■ FAX 412-75	13.05-13.25	13.50-13.70	13.90-14.10	13.95-14.15	14.10-14.30	14.25-14.45	14.40-14.60	14.50-14.70	14.80-15.00	14.80-15.00	Density G/CM	ה ק ק
1-4824 ■ Visit our Web site: www	Extreme Impact Header Dies	High Impact/Heavy Shock Crushing Hammers, Severe Impact Blanking, Header Dies, Difficult Coining & Swaging Dies	Good Wear/Medium Impact Scroll Dies, Stamping Dies, Lamination Dies, Ironing Dies	Excellent Wear/Edge Strength Lamination Dies, Coining Dies, Blanking Dies, Crush Rolls, Stamping Punches	Good Wear/Medium Impact Cut Edge Rings, Slitters, Stamping Punches & Dies, Lamination Dies, Extrusion Dies, Draw Dies, Compacting Dies, Blanking Brass & Bronze	Good Wear/Heavy Impact W-EDM Impact Punches, Extrusion Punches, Coining Dies, Swaging Dies, Draw Dies, Cold Forming	Excellent Wear/Light Impact Stamping Dies, Compacting Dies, Draw Dies, Rotary Dies, Round Tooling	Good Wear/Light Impact Stamping Dies, Compacting Dies, Can Forming Dies, Necking Dies, Medium Wire Draw Dies, Shearing Knives, Ironing Rings	Excellent Wear/Light Impact Seal Rings, Slitters, Planer Knives, Compacting Powder Metal, Abrasive Nozzles, Nonferrous Machining, Saw Blades	Extremely Hard/Light Impact Blades, Wear Parts	Applications	ADE SPECIFIC
nnovat	3.5	Υ	1.3	õ	÷	3.0	õ	1.3	1:3	ò	Grain Size	
ivecarbide.com	24.6	17.3	8.6	7.0	6.9	12.1	3.6	4-3	3.5	3.1	Relative Wear Resistance Vol. Loss mm ³	S N O